

## Thirst for Reform?

### Private Sector Participation in Providing Mexico City's Water Supply

*Luke Haggarty*

*Penelope Brook*

*Ana Maria Zuluaga*

In the early 1990s Mexico City's Federal District (the D.F.) initiated a series of service contracts with four operators in the private sector—each to be implemented in three stages over ten years. The idea was to introduce competitive pressures and to find out if a "gradualist" approach would reduce social and political opposition to private sector involvement and would allow the government to address pricing problems and strengthen regulatory arrangements.

The World Bank  
Development Research Group  
Regulation and Competition Policy  
August 2001



## Summary findings

The case in Mexico City offered an opportunity to observe the advantages and disadvantages of gradualist reform. Unfortunately Haggarty, Brook, and Zuluaga find that the long-term nature of an incremental approach does not match well with the generally shorter-term horizons of elected politicians. Difficult decisions in implementation are left to later years, which pushes potentially unpopular actions onto the shoulders of future administrations, while allowing the current government to claim credit for instituting reform.

The reform planned—and implemented—was not designed to tackle the city's most serious water problems, including overconsumption and waste. And reform did little to change residential consumers' incentives to conserve water.

Overexploitation of the aquifer has been a problem since at least the 1930s. Mexico City is built on a series of drained lakebeds, and the land is soft and prone to settling, or subsiding, as the aquifer is depleted. Several areas of the city center have sunk by over two meters in

the past decade alone. And by virtue of its location and elevation, the city's alternative water sources are expensive. The need for change is stark, but the power to undertake reform to tackle broad problems of resource management in the city and surrounding areas lies outside the jurisdiction of the D.F. with the federal government. Such external funding of major supply projects weakens the incentives for conservation. Reform reduced the increasing rate of overexploitation of the aquifer, but partly by simply failing to meet demand.

Reform to provide more equitable and sustainable water delivery must focus on improving the efficiency of operations, on substantially reforming the way water resources are priced and allocated, and on the design, management, and pricing of wastewater services. Federal subsidies for new production must be reduced, prices for system operators and consumers must rise, and more must be invested in the treatment and storage of wastewater—all of which requires strong political leadership.

---

This paper—a product of Regulation and Competition Policy, Development Research Group—is part of a larger effort in the group to analyze institutional issues in regulated infrastructure. The study was funded by the Bank's Research Support Budget under the research project "Institutions, Politics, and Contracts: Private Sector Participation in Urban Water Supply" (RPO 681-87). Copies of this paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Paulina Sintim-Aboagye, room MC3-422, telephone 202-473-7644, fax 202-522-1155, email address [psintimaboagye@worldbank.org](mailto:psintimaboagye@worldbank.org). Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The authors may be contacted at [lhaggarty@worldbank.org](mailto:lhaggarty@worldbank.org) or [pbrook@worldbank.org](mailto:pbrook@worldbank.org). August 2001. (69 pages)

*The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the view of the World Bank, its Executive Directors, or the countries they represent.*

**Thirst for Reform?**  
**Private Sector Participation in Mexico City's Water Sector**

Luke Haggarty, Penelope Brook and Ana Maria Zuluaga



## TABLE OF CONTENTS

<b>I. Introduction.....</b>	<b>4</b>
<b>II. Conditions in the Water Sector Prior to Reform .....</b>	<b>6</b>
II.1 Historical and Macroeconomic Circumstances Leading to Reform.....	6
II.2 The Water Sector in Mexico City .....	7
<b>III. Political Circumstances Leading to Reform of Water .....</b>	<b>15</b>
III.1 Political Factors Favoring Water Reform and Private Sector Participation .....	15
III.2 Political Factors Working Against Water Reform.....	21
<b>IV. Design of the Reform.....</b>	<b>24</b>
IV. 1. Organizational Structure for Regulation and Operation .....	24
IV. 2 Private Sector Contracts .....	25
IV.3 The Transaction .....	29
<b>V. Implementation Experience.....</b>	<b>31</b>
V 1. Delays .....	32
V 2. Regulation: Monitoring, Coordination and Tariff Setting .....	33
V 3. Renegotiation.....	37
<b>VI. Reform Outcomes .....</b>	<b>39</b>
VI 1. Information.....	39
VI.2 Metering, Billing and Collection.....	40
VI.3 Service .....	44
VI.4 Operating Efficiency .....	45
VI.5 Influence of Politics on Outcomes .....	48
VI.6 Accomplishments and Failings of the Contracts .....	51
<b>VII. Beyond the Reform: Unresolved Key Policy Issues .....</b>	<b>52</b>
VII.1 Social Costs of Water Consumption .....	52
VII.2 Costs of Wastewater and Sewage Disposal.....	55
VII.3 Effects on the Poor.....	57
<b>VIII. Conclusions.....</b>	<b>61</b>

## LIST OF ACRONYMS

CADF - Comision de Agua del Distrito Federal

CNA - Comision Nacional de Agua

CONAMUP - Coordinadora Nacional de Movimientos Urbanos Populares

DDF - Federal District Department (Pre-1997)

GDF - Government of the Federal District (post 1997)

D.F. - Distrito Federal

DGCOH - Direccion General de Construcion y Operacion Hydraulica

FDN - Frente Democratico Nacional

GATT - General Agreement on Trade and Tariffs

MUP - Movimientos Urbanos Populares

NAFTA - North American Free Trade Association

OECD - Organization for Economic Cooperation and Development

PRD -Partido de la Revolución Democrática (Successor to the FDN)

PRI - Partido Revolucionario Institucional

PRONASOL - Programa Nacional de la Solidaridad (a.k.a. Solidarity)

SPP - Ministry of Budget and Planning (Federal)

## I. INTRODUCTION

In the early 1990s Mexico City – more precisely the *Distrito Federal* (D.F.) – seeking to reform and improve urban water services, initiated a set of service contracts with private sector partners. While service contracts are commonplace in the water and sanitation sectors, the Mexico City reform has two unusual features. First, it involved not one but four private sector operators. Second, the contract with each operator was to be implemented in three stages over a ten-year period. These features are of interest to the extent that the Mexico City experience can tell us something about the use of multiple private partners and progressive step processes to increase the benefits and sustainability of private sector reforms in water.

The decision to involve four operators introduces the possibility of competitive pressures for improved performance through comparisons and benchmarking. The decision to use a staged approach is of interest to the extent that it can shed light on the question of whether “gradualist” approaches to private sector participation are more effective in reducing the kind of social and political opposition often faced by more radical forms of private involvement. In particular, a gradualist approach holds out the possibility of introducing the private sector over an extended period, thus building up confidence and trust within the government and among the general population. It may also allow the government to address pricing problems and introduce or strengthen regulatory arrangements on a gradual basis after securing private partners – reducing the risk of potentially politically costly price shocks, and allowing careful attention to the design of regulatory arrangements.

Incremental reforms also present risks, however. The long-term nature of such plans does not fit well with the generally shorter-term horizons of politicians, particularly in electoral government systems. The difficult decisions in the implementation of such plans are often left to the later years so as to push potentially unpopular actions onto future administrations while allowing the current government to claim that it is instituting reforms (Brook Cowen, 1997). The Mexico City case presents an opportunity for observing the advantages and disadvantages of gradualist reforms in practice.

More broadly, the case is of interest because the chosen reform tackled only tangentially, and in a limited way, what is perhaps the most serious long-term issue in the water and sewerage sector in the city: the improved management of a scarce and fragile

water resource. An understanding of the constraints that produced this result and the implications it had on reform effectiveness may help give a better sense of the prerequisites for fully effective sectoral reforms.

This paper seeks to address the following questions: What were the factors motivating and constraining reform – and why did the reform take the form it did? Once implemented, to what extent did the reform follow the intended path, and produce expected outcomes? To the extent that there was divergence from the intended path, why did this occur?

The paper is set out as follows. Section II describes the conditions in the sector and the city prior to reform. Section III discusses political factors motivating and constraining reform. Section IV describes the service contract approach adopted in Mexico City, and Section V describes the implementation experience. Section VI discusses the outcomes of the reform. Section VII looks at the extent to which the reform had any impact on the broader policy issues of water resource management, pollution control and improved services to the poor. Some conclusions are set out in Section VIII.



## II. CONDITIONS IN THE WATER SECTOR PRIOR TO REFORM

### II.1 *Historical and Macroeconomic Circumstances Leading to Reform*

We generally expect reforms involving substantial, long-term private sector participation (PSP) to be easier to implement when motivated by a strong or long-term crisis than by a mild or temporary crisis. In Mexico, while a macro-economic crisis did help to precipitate reform of the Federal District's water system, the resulting reform was a rather limited one, that deferred difficult political decisions.

(i) *The Precipitating Crisis.* In 1982 the "Mexican miracle" of over three decades of strong economic growth ended abruptly.<sup>1</sup> Easy foreign credit, fueled by vast quantities of petro-dollars, had been used to prop up the overextended and inefficient Mexican state. The sudden disappearance of these propelled Mexico into deep economic crisis: GDP contracted by over 4% and inflation rose to over 100% in 1983.<sup>2</sup> GDP contracted again in 1986 and inflation continued at levels between 50 and 130 percent. The government of President de la Madrid (1982-1988) took a number of steps to curb the decline, including a large privatization program.

In 1987, towards the end of de la Madrid's six year term, inflation was soaring to over 130 percent annually despite multiple austerity programs and growth was still elusive. The ruling Partido Revolucionario Institucional (PRI) was suffering defections on both the left and the right and facing the most vigorous electoral opposition in its history. To stave off a renewed round of capital flight and a loss of confidence by investors, President de la Madrid ignored dissenters within the PRI and chose his technocratic Minister of Budget and Planning (SPP), Carlos Salinas de Gortari, as the PRI presidential candidate. This increased the internal divisions within the party leading to the defection of a number of high level party members who formed a left wing opposition coalition, the Frente Democratico Nacional (FDN). The outcome of the presidential elections in 1988 shocked the PRI. For the first time parties on both the left and the right hotly contested a presidential election. President Salinas was elected with only 50.7% of the vote, although many believe that the counting process was so plagued by fraud that

---

<sup>1</sup> During the decade before the crisis (1972-81), GDP had grown at an annual rate of over 7% inflation had generally been low by Latin American standards (WDI, 1997).

<sup>2</sup> WDI, 1997

Salinas' margin of victory would have been much smaller had the election been fully free and fair.<sup>3</sup>

In the face of continued sluggish economic growth of slightly more than 1 percent and inflation of over 100 percent in 1988<sup>4</sup>, President Salinas decided to push reforms further and faster. In 1989 his economic cabinet approved the divestiture of all public enterprises in sectors not expressly classified as “strategic” in the constitution (Teichman, 1995). This opened up a number of sectors to private participation where it had not previously been considered, including infrastructure such as roads, telecommunications, energy and water.

The water sector was targeted for early reform (Buras, 1996). In 1989, a new federal water policy aimed at increasing the efficiency of water usage by decentralizing management to state level water commissions. The administration also passed a new water law in 1992 that a) established the concept of water as a commodity (rather than a “social good”); b) endorsed the use of market mechanisms to manage water resources and c) promoted local participation in water management (ibid). State water commissions were established with control over and responsibility for water services in their areas. And reform of service providers was decentralized — thus providing a framework for private participation.

## ***II.2 The Water Sector in Mexico City***

Mexico City had for a long time faced acute problems in the water and sanitation sectors. Some of these problems – such as weak and fragmented arrangements for the management of water and sanitation services, inadequate maintenance, poor billing and collections performance and entrenched under-pricing relative to service costs – were, at least in theory, solvable through a well-designed program to engage the private sector in service delivery. Other problems – most notably involving the protection and sustainable management of water resources in the Valley of Mexico and surrounding states – were likely to be less tractable.

---

<sup>3</sup> Centeno, 1994, Purcell, 1995. There are also a minority of scholars who claim Salinas would have lost the election entirely had it been fair. See Reding, 1989.

<sup>4</sup> WDI, 1997.

This section focuses on three key factors: the scarcity of water resources and therefore the high opportunity cost of meeting the city's needs, the high demand for services, and the fragmentation of responsibilities for the provision of water (and sewerage) services in the city. It then provides data on the performance of service providers in the city prior to reform.

(i) *Scarcity of Water Resources.* The availability of raw water resources to supply the D.F. is seriously constrained by geographic factors. Mexico City is built on the floor of a drained lake — the site of the former Aztec city Tenochtitlan — high in a mountain valley. The city has a long and precarious hydrological history, combining severe water shortage with severe flooding. Both have been combated by heroic engineering projects to mine the aquifer underlying the city, to bring water from ever more distant river valleys which are one kilometer, in altitude, below the city, and to provide drainage away from the city for wastewater and floodwaters.

At the time of the reforms (1993) total water production for the D.F. was around 35.3 m<sup>3</sup>/second. (In the Valley of Mexico as a whole, production was around 60 m<sup>3</sup>/second.)<sup>5</sup> The greater part of Mexico City's water was drawn from the aquifers underlying the city, from wells with depths of 70 to 200 meters. Most of the rest of the water came from two distant sources: the well fields in the Lerma Basin (60 kilometers distant), and the Cutzamala River (127 kilometers distant, and some 1,200 meters in altitude below the city)<sup>6</sup>. Table 1 summarizes the main water sources for the Federal District.

**Table 1: Raw Water Sources for the Federal District (1993)**

<b>Raw Water Sources</b>	<b>Total Supply (m<sup>3</sup>/second)</b>	<b>Share of Total Supply (%)</b>
Internal (Basin of Mexico)	23.4	66.3
Imported Sources	11.9	33.7
<b>Total Water Supply</b>	<b>35.3</b>	<b>100.0</b>

*Source:* Joint Academies Committee on the Mexico City Water Supply, 1995.

The extraction rate from the aquifer (for the metropolitan area as a whole) was around 42 m<sup>3</sup>/second, while the replenishment rate was only around 24 m<sup>3</sup>/second. From 1986 to 1994 alone the aquifer beneath the central sections of the city dropped by 6-14

<sup>5</sup> Joint Academies, 1995 , p. 21.

<sup>6</sup> *ibid* p. 22.

meters (DGCOH, 1994). Because Mexico City is built on a series of drained lakebeds, the land is soft, and prone to subsidence as the aquifer is depleted. Since the beginning of groundwater exploitation in the late 19th century, the downtown area of the D.F. has sunk by an average of 7.5 meters. Several areas of the city center have sunk by over 2 meters in the last decade alone (ibid). By virtue of its location and elevation, the city's alternative water sources are expensive ones. For example, plans are currently underway to bring an additional 5 m<sup>3</sup>/second to the D.F. and the State of Mexico from a new source some 140 kilometers distance and 1000 meters lower in elevation, at an cost of around US \$500 million.

From a water resource perspective, therefore, the need for change would seem stark. However, the power to undertake reforms that could tackle the wider water resource management problems of the city and surrounding region lies outside the jurisdiction of the D.F.. Therefore, any reforms that the D.F. could feasibly implement would be, at most, a partial contribution to resolving these problems. Similarly, responsibility for developing and funding new water sources, outside of the district does not fall directly on the D.F. but rather on the Federal Government. Such external funding of major supply projects means that the incentive to reform, so as to conserve on the very large costs associated with new supplies is weakened.

(ii) *Demand.* Demand for water services was large and growing. Mexico City has one of the largest populations in the world. The D.F. has been growing rapidly: from a population of 4.8 million in 1959 it had grown to 8.5 million by the early 1990s (Gamboa de Buen, 1994). The Metropolitan Zone of the Valley of Mexico, in which the city is located, supported a population of 15 million (Joint Academies, 1995).

At the time of the reforms, Mexico City had a relatively high rate of existing connections by developing country standards. As can be seen from Table 2, ninety-five percent of residents in 1990 had access to potable water in their houses or on their lots through the formal distribution network, and over 85 percent had direct sewerage connections.<sup>7</sup> Such high levels of connection generally reduces one of the possible motivations for attracting private capital since it does not require large new investment

---

<sup>7</sup> There is some evidence that the official census overstates coverage rates because it tends to undercount low-income, self-housing (see Joint Academies, 1995 p.270) however it is difficult to estimate the significance of the variation.

for the expansion of the network. While new investment was potentially needed to tap new sources of bulk supply, both to satisfy growing household needs and to take pressure off the aquifer, to expand wastewater treatment and to rehabilitate the ageing network, none but the last was contemplated as part of this reform.

**Table 2: Water and Sewerage Services Coverage in the D.F. in 1990 and 1995**

<b>Water Services</b>	<b>1990</b>	<b>1995</b>	<b>Sewerage Services</b>	<b>1990</b>	<b>1995</b>
Inside the house	71.5%	76.76%			
Inside the lot	23.5%	20.41%			
Total Direct Water Coverage	95.0%	97.17%	Direct Sewerage Coverage	85.7%	91.3%
Standpipes	1.3%	0.71%	Septic Tank	6.8%	4.8%
Total Water Coverage	96.3%	97.88%	Total Sewerage Coverage	92.5%	96.1%

Source: Census 1990 and 1995, INEGI.

(iii) *Fragmentation of Sectoral Responsibilities.* The management of the city's water distribution and sewerage system at the time of reforms in 1992 was fragmented and weak. There was no water utility, in the conventional sense; rather, responsibility for service delivery was spread across three distinct sets of institutions each answering to a different part of the District government. (See Table 3).

**Table 3: Administrative Arrangements in the Water Sector Pre-reform (1991).**

<b>Agency</b>	<b>Responsibility</b>	<b>Reports to</b>
DGCOH	Construction and maintenance of primary water and sewer networks	Secretary of Works and Services (DF)
<i>Delegaciones</i>	Construction and maintenance and operation of secondary water and sewerage networks.	Secretary of Government (DF)
Treasury	Meter reading, billing and collections	Secretary of Finance (DF)

*Direccion General de Construcion y Operacion Hydraulica (DGCOH)* - The DGCOH was the primary agency responsible for water infrastructure within the D.F. and its budget was set and monitored as part of the overall budget allocated to the Secretary of Works and Services. While its principal mandate was to construct and operate the primary network and water treatment plants, it also did a significant amount of construction and repair of the secondary network. Some observers describe it as a slush fund for the *delegaciones* (see below) because it frequently supplied them with material,

engineering and labor to carry out repairs or extensions of the secondary network<sup>8</sup>. Such an arrangement was politically useful as the Mayor could redistribute resources without indicating this in formal budget documents. DGCOH's staff was generally perceived as highly professional, but strongly oriented toward construction rather than operation and maintenance of the existing system. For example, its reports measured impact principally in terms of network kilometers added, treatment plants constructed and cubic meters of water produced.<sup>9</sup> Since DGCOH had no revenue collection role this may not be surprising.

*Delegaciones* - Tasks relating to the operation and maintenance of the secondary distribution network were the responsibility of the city's 16 *delegaciones*, political sub-units who report to the Secretary of Government and the Mayor. Their operational arms are thus subject to strong political influences. Indeed, delivery of water services were put under the direction of the politically oriented Secretary of Government rather than a technical Secretariat such as Works and Services. One of the roles of the *delegacion* water department was to decide who would receive water and when. Because there was not enough water within all of the *delegaciones* to meet demand, particularly in the poorer areas of the city, the *delegacion* water department would ration consumption through a pre-announced schedule of intermittent supply. Good time series data on intermittent supply was not available but even in 1998 there were areas of the city that received water once a week and sometimes once every nine days.<sup>10</sup> Such a situation was ripe for political exploitation and there have long been allegations that water shortages are created and then resolved by party officials to ensure voter loyalty (Coulomb, 1994).

Good historical data on labor within the *delegacion* water departments was not available, however current estimates provide a reasonable picture of their size. In 1998 the average *delegacion* water and sewerage operations employed about 300 people.<sup>11</sup> Field interviews reveal that overstaffing was common and was estimated at about fifty percent, largely the result of years of political patronage. Workers in the water sector,

---

<sup>8</sup> Field interviews in DGCOH and several *Delegaciones*.

<sup>9</sup> DGCOH Compendio, various years.

<sup>10</sup> Field interviews in Tlalpan and Itztapalapa and DGCOH 1998b.

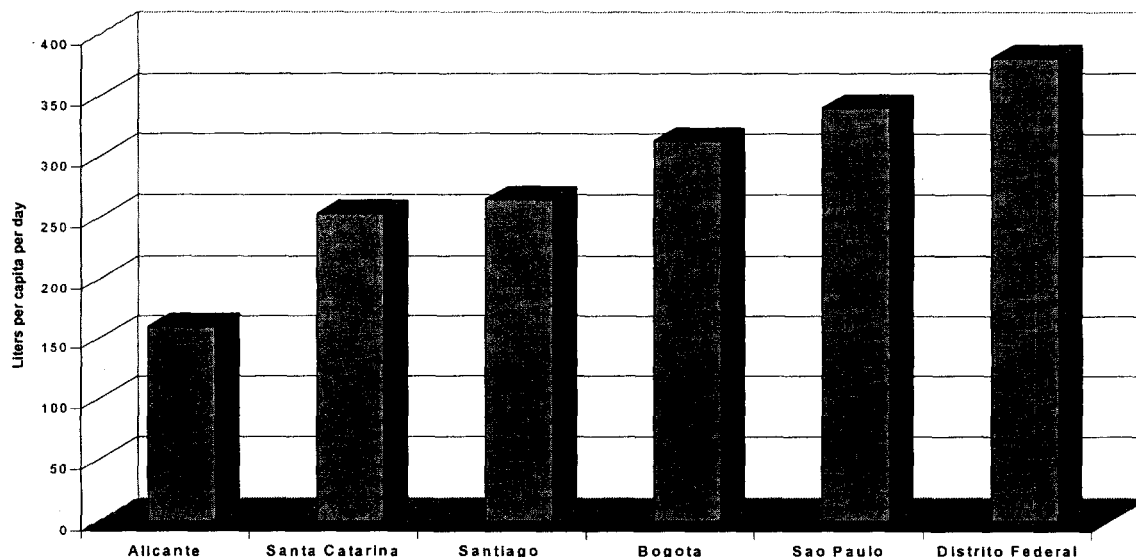
<sup>11</sup> Obtaining detailed information on the water operations of the various delegations has been difficult since they vary tremendously in size and institutional arrangements, for example, in 1998 the central *delegacion* of Benito Juarez had 130 people working on the water and drainage system whereas the Southeastern *delegacion* of Itztapalapa had 1,000. (Field interviews)

like those of the rest of the D.F. government, were highly unionized and labor rules made it nearly impossible to reduce the work force.

*Treasury* – Before reform responsibility for billing and collection rested with the D.F. Treasury. In part this was justified on the basis that the DGCOH and the *delegaciones* lacked the requisite financial expertise, but this arrangement also fit well with the centralized political structure of the D.F. By centralizing billing and collection within the Treasury, the Mayor was able to control all flows of funds and thus ensure that all the *delegaciones* would be dependent on his office and unable to finance an independent power base.

(iv) *Sectoral Performance.* Under these arrangements, the management of operations was weak, creating scope for gains from private participation. The pressure on bulk water resources could have been significantly lessened by reducing consumption and waste, but little was done to effect this. Aggregate water use in the D.F. was high by both industrialized and developing country standards. Total water consumed by the city, measured by water produced over population covered, was about 379 liters per person per day in 1993. This was exceptionally high in comparison with consumption levels in Europe which average between 200-300 liters per person per day (Figure 1). In part, these high “consumption” figures reflect high physical losses. However, they are also likely to result in part from lax billing, and from tariffs set well below the cost of delivering water to households.

**Figure 1: Per Capita Water Production in Selected Cities (1990)**



Source: Mexico DGCOH, Other countries Yepes and Dianderas, 1996. All figures 1990 except Sao Paulo which is 1988.

The ratio of unaccounted-for-water (physical plus commercial losses to production) was high by developing country standards (see Table 4). Given the cost of new water sources, these losses imply a substantial financial burden – if not for the D.F. itself, for the country as a whole.

**Table 4: Comparative Statistics on Water Loss**

City / Country	Year	% Physical Losses	% Total UfW
Bogota, Colombia	1991	14	40
San Jose, Costa Rica	1990	21	46
Dakar, Senegal	1993	n.a.	29
Manila, Philippines	1988	n.a.	59
Mexico City	1992	37 <sup>1</sup>	51 <sup>2</sup>
Sao Paulo, Brazil	1992	n.a.	40

**Sources:** For all cases other than Mexico: Yepes and Dianderas, 1996. For Mexico, 1- DGCOH Plan Maestro, 1997 is the only estimate of losses available and is expected to have been the same in 1992 and 2 - authors' lower bound estimates.

Such high physical losses reflected poor maintenance. At the time of reform there was no program to detect and repair non-visible leaks in the secondary network and leak detection in the primary network used outmoded technology.<sup>12</sup> Leakage problems were aggravated by land subsidence since water and drainage pipes are buckled and broken as the city sinks.

As for commercial losses, in 1992 over 22 percent of all connections were not registered. Even those customers who were registered and did receive a water bill often did not pay. While 53 percent of registered customers had meters installed most of them were not being read regularly. According to Ochoa (1998), prior to reforms the Treasury received regular payments from only 500,000 customers out of an average of 1,200,000 bills sent out.<sup>13</sup> Using a combination of data from the census and the *Comision de Aguas del Distrito Federal* (CADF) and the most favorable assumptions we estimated maximum collection efficiency (collections/total billed) in 1992 at 62%.

<sup>12</sup> This was a very serious problem in some sections of the city, particularly the South and South-East where large caverns have been detected in the late 1990s from long undetected leaks which were spraying water down. (Field Interviews with Delegations)

<sup>13</sup> Ochoa, 1998 (mimeo) p. 7



Not all of these usage problems could have been addressed by private participation alone. Tariff policy was also at fault, providing little incentive to those customers who did receive a metered bill to reduce their consumption. Between 1970 and 1990 water tariffs had been changed just five times and by 1992 tariffs covered only around 28 percent of operating expenses plus investments, excluding interest and debt (For a more detailed discussion see section V). The combination of low tariffs and poor billing and collection practices resulted in low revenues that in 1992 covered just 54% of operating costs.

Labor productivity was also poor by international standards (see Table 5). For example, Mexico City had three times as many employees per thousand connections in the pre-reform period as did Lima, Peru.

**Table 5: Comparative Labor Productivity Figures**

Country/City	Year*	Employees / '000 connections
Guinea (Conakry)	1989	20.0
Ivory Coast	1987	8.3
Mexico City§	1992	13.4
Peru (Lima)	1991	4.6
USA (average)	1990	2.7

\*For all cases except the USA, year chosen is that preceding a reform attempt.

§ Employment figures for Mexico City have been calculated based on actual figures for the DGCOH, reported figures for Treasury employees involved in billing and collections for water, and estimates of *delegacion* employment for water services.

*sources:* [Other case studies]; for USA, Yepes and Dianderas (1996), p. 17.

(v) *Sector Circumstances and the Impetus for Reform.* In sum in 1992 the water system in Mexico City faced serious problems. Demand was high, the aquifer was declining, the city was sinking, and alternative sources of new water were expensive. Weak operations and maintenance lowered efficiency and increased costs while low tariffs and deficient cost recovery aggravated the water supply problem.

Yet many factors made a radical reform involving private participation, such as a concession, unlikely. For one thing this “crisis” was not new. Over-extraction of the aquifer had been recognized as a problem since at least the 1930s and the city had already committed to two very expensive projects for importing water from distant sources. Moreover, ultimate responsibility for developing these sources — and carrying a heavy share of the costs — was largely borne by the Federal Government. The price charged to the D.F. for bulk water delivered to the city did not reflect the investment costs, and the

D.F. had a long history of not charging the opportunity cost for water extracted from the aquifer.<sup>14</sup> The problems that motivated the city to seek private participation were largely operational, poor billing and collection, lack of maintenance of the secondary network and overmanning. Addressing even these problems required some difficult political decisions, as we show in the next section.

### **III. POLITICAL CIRCUMSTANCES LEADING TO REFORM OF WATER**

In the previous section, we showed how the physical and organizational state of water services in Mexico City made them ripe for reform. In this section, we consider the political factors that created the possibility of reform, while simultaneously constraining the shape that reform could take. The section begins with a discussion of how a political crisis caused the ruling party to focus on urban water services in the country as a whole, while the D.F.'s political structure created favorable circumstances in Mexico City. Disillusionment with reform under public operation led the government to choose private sector participation. We will then show how, notwithstanding these favorable circumstances, the configuration of likely winners and losers from reform, combined with long-standing political sensitivities surrounding access to and pricing of water services, made thorough-going reform politically difficult.

#### **III.1 *Political Factors Favoring Water Reform and Private Sector Participation***

(i) *Water Reform and the Electoral Fortunes of the PRI.* Rapid urbanization in Mexico, among other factors, led to a crisis in Mexico's ruling party, the PRI. In response to this crisis the ruling administration launched programs to expand and improve urban services. While initially politically successful, at least in the D.F., these programs proved to be unsustainable.

The roots of the PRI's crisis were in the Party's corporatist structure. The party was organized into three different sectors: the peasant sector, the labor sector and the "popular" sector that was meant to accommodate everyone else. Each of these "sectors" was in turn composed of numerous party organizations through which important parts of

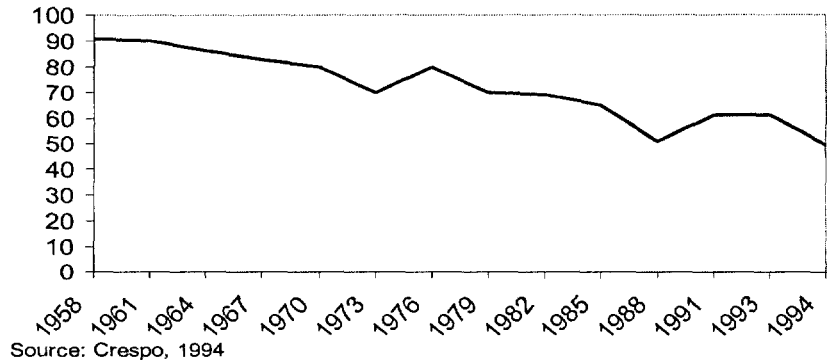
---

<sup>14</sup> Field interview with CNA.

the support base (e.g. rural peasants, urban unionized labor, teachers, businessmen, etc.) were meant to interact with the ruling party.

**Figure 2: Percent of the Vote Won by the PRI in Congressional Elections**

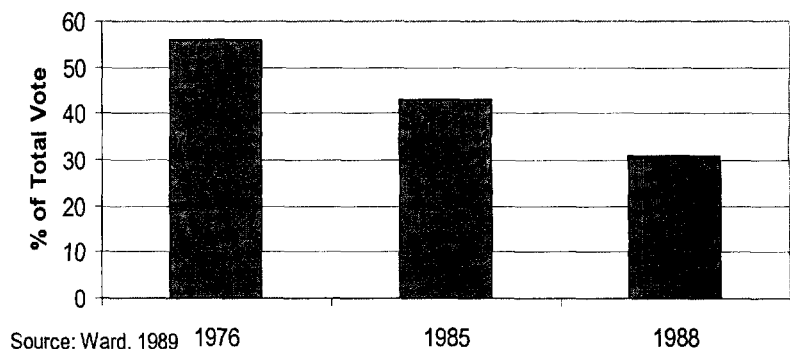
Nationally the PRI had been steadily losing electoral ground for many years as can be seen from Figure 2. In part this decline was due to the national electoral reforms of 1977 and 1986 which the PRI had implemented in response to



popular demands for greater democracy. However, although these reforms allowed greater opposition representation in the legislature, they did not seriously endanger the PRI's national hegemony (see Annex 1). More important to the dramatic fall in support between 1982 and 1988 were the economic austerity programs instituted by the de la Madrid administration, which reduced the resources that could be distributed by corporate or local Party leaders (Gomez Tagle, 1993 and Baer, 1993).

**Figure 3: PRI Electoral Fortunes in D.F. Congressional Elections 1975-1988**

Another important factor in the PRI's declining support was Mexico's growing urbanization. The percentage of the population living in rural areas in Mexico fell from 78% in 1940 to only 28% by 1990 (Basáñez, 1993). The



Party's structure had been designed for the political realities of the 1930s and was not well suited to incorporate the growing urban lower and middle classes. Thus, the PRI was losing ground even more rapidly in urban areas than in the nation as a whole, this was especially true in the D.F. (

Figure 3). In particular the PRI had been ineffective at incorporating “Popular Urban Movements” (*Movimientos Urbanos Populares*- MUPs) that had come to represent an increasingly important segment of society since the 1970s. These autonomous associations were formed in an effort to secure services for the lower classes in many urban and peri-urban areas throughout Mexico. Because the PRI had failed to draw these organizations into its corporatist structures, the large numbers of migrants who moved to the city were largely uninvolved in the Party (Ramirez Saiz, 1992 and Haber, 1993). Although not traditionally active in electoral politics, there is evidence that a number of these organizations and their members participated and heavily favored the leftist Frente Democratico Nacional (FDN) in the 1988 elections (Centeno 1994, Klesner 1996, Haber 1996).

Despite winning the 1988 presidential elections, the PRI did poorly in most urban areas and in the D.F. in particular; winning just 27% of the vote, compared to 48% won by the FDN and 22% for the right wing Partido Accion Nacional (PAN). In the D.F. the FDN dominance was near total, Cardenas took 37 any of the 40 electoral districts (13 with over 50% of the vote) while Salinas did not win a single electoral district.<sup>15</sup>

After the narrowest presidential electoral victory in PRI history the Salinas administration launched a concerted effort to recapture lost electoral ground, particularly in areas that were seen to have defected to the FDN. Aggressive new participatory programs were launched to raise the rates of delivery of public services to the poor with strong emphasis on potable water and sewerage. The largest component, about 40% of total expenditure (Lustig 1994) of the largest of these programs, PRONASOL, was water and sewerage which has been described as the “heart of PRONASOL” (Bailey and Boone, 1994).<sup>16 17</sup>

---

<sup>15</sup> This section draws on data from Calderon Alzati, and Cazes, 1991. The FDN coalition also presented a unified list (single coalition candidates) in the D.F. Senate races and won both with 39% of the total vote. The coalition members could not agree on single candidates for congressional seats and so did not win a single district. The PRI won 26 congressional districts while the PAN won 14.

<sup>16</sup> The actual targets of these programs has been the subject of some debate, with the administration claiming that they exclusively targeted the poor while numerous opposition figures, as well as political scientists, have claimed that the expenditures were politically driven. However Molinar Horcasitas and Weldon (1994) clearly shows that the programs were, at least in part, driven by electoral politics. They demonstrate that PRONASOL expenditures in 1990 were targeted precisely at areas that the Salinas administration wished to recover electorally in 1991. A significant portion of these funds was spent on areas that had voted for the FDN in 1988 (Molinar Horcasitas and Weldon 1994 )

<sup>17</sup> The underlying assumption of this strategy was that many of those who voted for the FDN in 1988 did so to protest the economic hardships they had undergone during the stabilization period of 1982-88

The strategy was highly effective in reversing PRI's electoral fortunes in the capital. By the time the 1991 Congressional (and D.F. Assembly) elections took place, the PRI had gained 46% of the D.F. votes in the senate and deputy elections and taken all *delegaciones* in the local assembly elections. (IFE, 1991)

In the D.F., however, the strategy was not sustainable in the long run because it failed to address the underlying resource constraint or to reduce the high cost of the D.F. water system to the Federal Government.<sup>18</sup> For many years the D.F. had run large budgetary deficits which were routinely covered by the Federal Government (Segundo Informe Annual, 1990 and Gamboa de Buen, 1994). Prior to 1989, the D.F. received some 75% of its total budget from Federal funding through either revenue sharing or budgetary transfers (Beristain, 1995). The water system was one of the two largest expenditure categories in the D.F. budget (the other was the Metro). Transfers to the D.F. were unsustainable for two reasons: (i) low oil prices and greater difficulty in borrowing internationally had made federal funds scarce and (ii) such large subsidies to the D.F. did not fit with Salinas' shift in focus to poorer communities. Therefore one of President Salinas' main concerns for the D.F. was to find a way to increase internally generated revenues, and yet continue to maintain the political gains among the poorer sections of the population.

(ii) *Structure of the Distrito Federal and the Rise of Camacho.* Another important factor affecting the shape of the D.F. water reform was the dominant role of the Presidency in local administration. Unlike every other state and municipality in the republic, the D.F. did not have a popularly elected mayor until 1997.<sup>19</sup> For most of the last 50 years) the D.F. mayor was a direct presidential appointee who automatically held a

---

and not because they were ideologically committed to the FDN (and later the Partido de la Revolución Democrática - PRD). This appears to have been the correct diagnosis as the urban poor in general, and MUPs in particular, were not attached to any political party but proved to be more pragmatic in their voting patterns, supporting whoever would meet their demands. Dresser, 1994.

<sup>18</sup> In fact these programs could exacerbate problems within an unreformed system by increasing water shortages and the percentage of water lost to leakage since the participatory program work was frequently of a lower standard. (Field Interviews)

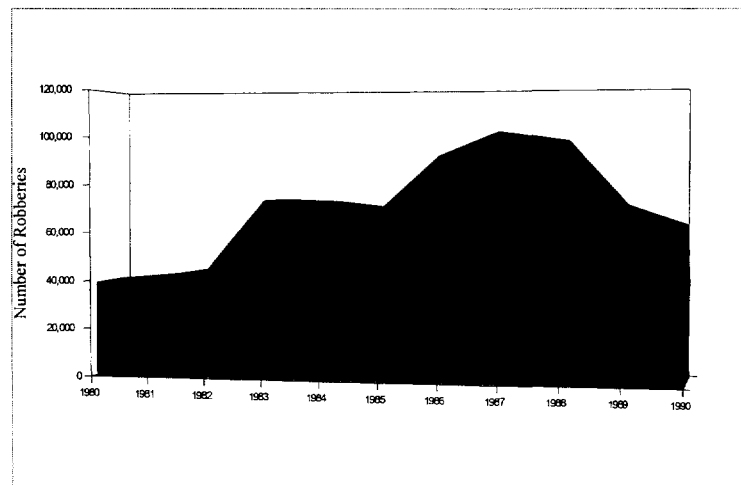
<sup>19</sup> The Federal District of Mexico (D.F.) has existed as an entity since 1824 but was given its current form by a Presidential decree in 1928. This was in response to two basic problems; the inability of some of the local municipal governments to deliver services due to their poor financial state and the political infighting between factions in various municipalities which made coordinated city management impossible. Ward, 1989

high cabinet position in the Federal Government. The D.F. itself is broken up into 16 political units or municipalities known as *delegaciones*. Each *delegacion* is controlled by a local municipal head or *delegado*, and the president also had the power to appoint or confirm the mayor's nominee for these positions.<sup>20</sup> The D.F. did (and does) elect deputies to the lower house of Congress as well as two senators, just as in any other state, and during the early years of this reform (until 1993-94) the national Congress carried out all legislative duties for the Federal District.<sup>21</sup>

In 1988 President Salinas appointed Manuel Camacho Solis as Mayor and part of his remit was to reduce the D.F. burden on the Federal budget. Mayor Camacho saw the D.F. as a stepping stone to the Presidency in 1994. To serve his goals and reduce the D.F. dependence on Federal funds, the Mayor had to build a strong support base within the D.F. (field interviews).

**Figure 4: Robbery Statistics in the D.F. 1980-90**

One way the Camacho administration built this support was by crushing a crime wave. As can be seen from Figure 4, the robbery rate in 1987 was more than double that of 1982. According to ex-Mayor Camacho the statistics for other crimes were equally bad; bank robberies and break-ins to homes were at all



Source: Segundo Informe del Gobierno, 1990

time highs. Both Camacho and a former aide stated that the dramatic decline in crime rates after they took office was of critical importance in establishing the administration's credibility<sup>22</sup>. Whether or not the Camacho administration was actually responsible for the

<sup>20</sup> This entire section of the structure of the DF government draws heavily on Ward, 1989

<sup>21</sup> The Federal District Representative Assembly was created as a popularly elected body in 1986 but had limited authority during most of the reform period when it acted as a "consultative body of the mayor" (Gomez Tagle 1993). The Assembly would not become a truly integral part of the ruling of the D.F. and gain legislative authority until the mid-1990s.

<sup>22</sup> Separate interviews with Manuel Camacho and Ignacio Marvan in Mexico City, 1997.

declines is less important than the political support generated from the perception that the new administration had addressed the crime situation effectively.

According to the ex-Mayor, the middle and upper classes, who felt themselves to be the targets of crime, were grateful for the reduction and therefore presented much less opposition to other policy changes. In particular when the administration announced raises in property taxes and water rates in 1990 they met less than expected resistance. These extra funds, in turn, allowed the administration to increase spending in poorer areas of the city in their effort to reverse the PRI's political fortunes. In keeping with his national priorities, President Salinas did reduce transfers to the D.F. and, by 1993, the D.F. became a net contributor to the rest of the Federal Republic (field interviews)<sup>23</sup>.

The PRI's strong showing in the 1991 mid-term elections set the stage for more ambitious reforms. The Salinas government launched the national water reforms described above, and the D.F. introduced contracts with the private sector.

(iii.) *Why Private Sector Participation?* The question naturally arises as to why the D.F. chose private sector participation to reform their water sector. The main reason was disillusionment with prior efforts to reform public enterprises. Under President de la Madrid, the national government had implemented a series of performance contracts in an attempt to improve state-owned enterprise performance. By the early 1990s these efforts were perceived to be having little positive effect and the government had shifted the focus of the program to the privatization of state-owned enterprises.

Similarly, in the D.F., the Camacho administration had initially put greater emphasis on the ongoing public sector reform attempt, the *Programa de Uso Eficiente del Agua* (PUEDA). This reform, begun in 1986, sought to improve the administration of water services by carrying out a user census, installing residential meters and promoting more efficient use of water, mainly through the improved technologies (toilets, sinks and faucets). However by 1992 the program was judged to be progressing too slowly; inter-

---

<sup>23</sup> This is confirmed by the analysis in Beristain, 1995. While transfers were still positive (though very small) the D.F. was contributing more in taxes than it was receiving from revenue sharing and so, by 1993 it had become a net contributor to the Republic.

agency coordination problems, lack of funds, and general lack of interest on the part of users due to low tariff levels were all blamed for the program's lack of success.<sup>24</sup>

### **III.2 *Political Factors Working Against Water Reform***

Two major factors were working against a radical reform in the D.F. water system. First, some of the administration's core constituents stood to lose from any reform that passed substantial responsibilities to the private sector. Second, water had long been highly politicized in Mexico in general, and the D.F. in particular, resulting in tariffs set well below costs of service delivery. As we will discuss below, the government chose a reform that did not, at least in the initial stages, require it to confront either of these problems. However, while these factors did not prevent the initiation of private sector involvement, they did eventually prove important in bringing the reform to a standstill. In this section we describe what these factors were and how they affected the initial design of private sector participation; in the section on implementation we discuss how they derailed the later stages of reform.

(i) *Potential Winners and Losers from Reform.* The distribution of potential winners and losers of a reform depends on the exact reform to be carried out. In this section we will examine how a reform that passed substantial responsibility for the water system to the private sector might affect different interest groups. As we discuss in sections IV and V the reform eventually chosen was a modest one that sought to mitigate the effects of reform on potential losers. Moreover, the reform as actually implemented was affected by the efforts of potential winners, and more strongly by potential losers, to modify the reforms and thus change the distribution of costs and benefits.

Those who might be expected to benefit from serious reform of the D.F. water system included: a) private companies (domestic and foreign) who expected to win contracts to operate the system; b) residents who were unconnected or had minimal service, and might expect expanded and/or improved service and; c) connected customers whose service might improve and who valued those improvements more than any price increases. National politicians would also benefit if the federal Treasury made fewer

---

<sup>24</sup> Information on the reforms comes from Schteingart and Torres, 1997, supplemented with an analysis of the data from the DGCOH *Compendio*, 1997 and field interviews.



transfers to the D.F. water system, and thereby freed resources they could use for their constituents.

Not all of these groups would weigh equally in the minds of the government. The private companies were clearly important for the PRI as it sought to raise funds for the upcoming 1994 campaign. The political pressure from those not connected to the system had diminished with the implementation of the participatory programs to bring water services to the poor. Both the level of the price rise necessary and the capacity to rapidly increase service quality were uncertain making benefits to connected customers more questionable.

Potential losers included: (a) current customers whose costs from increased prices might outweigh the value placed on improvements in service (e.g. better quality water, quicker connections, uninterrupted water supply, sufficient water pressure, rapid repair of leaks, etc.); b) employees and heads of existing public sector agencies who might be laid off or lose stature or benefits and; c) politicians who might lose the ability to reward supporters with jobs, investment contracts or increased water services. Again the groups varied in importance to the government and in their willingness and ability to affect reform design and implementation. As we saw above the currently connected consumers were a large portion of the public who might be expected to oppose any reform that entailed large price increases without dramatic improvements in quality. The public sector agencies and employees were of concern due to the high rates of unionization (which increased the likely incidence and effectiveness of broad public employee mobilization against reform) and the experience of problematic union opposition in the 1988 elections (Haber, 1996 and Wiarda, 1988). Lastly a large number of local politicians from the *Delegados* to the DDF Secretaries and the Mayor himself stood to lose significant patronage power if reforms went ahead as planned.

As we shall show in the discussion of the implementation experience in Section VI below, the net political costs of implementing all the stages of the contracts as initially designed outweighed the net benefits to important Government constituents within the D.F.. The result was a partial and selective implementation of the planned reform.

(ii) *The Political Importance of Water in the D.F.* The second factor working against reform was the political sensitivity of water issues in the D.F.. This sensitivity is perhaps reflected most strongly in the pricing of water services. As we saw in section II.2,

tariffs fell significantly below the cost of operation of services within the city and the retail price of water had only been revised five times from 1970-1990. The failure to adjust prices in line with costs occurred despite the fact that it led to large operational deficits for the sector that had to be met out of the general budget. Even more telling, however, was the Federal Government's decision on charges for aquifer extraction in 1989. The newly formed national water authority, the *Comision Nacional de Agua* (CNA), undertook a study that attempted to estimate the cost of water in various zones across Mexico based on the relative scarcity of the water and the productivity of its various uses (CNA, private communication). However when the Government set the price of the extraction rights it did not apply the cost estimate from the study to all users, instead it applied much lower rates to organizations which provided public services. As we will see in section VII, these rates are about two percent of what private parties pay to extract water from the same aquifer in the D.F..

Water's political importance is also reflected in legal restrictions on disconnections. Although article 27 of the Mexican Constitution of 1917 allows for the government to concession water rights to private persons, federal health legislation, passed in 1930s, bans the complete disconnection of residential users for non-payment. In compliance with this law the Federal District Financial Code states that service can be reduced to minimum "vital levels" but cannot be completely severed (Codigo Financiero del D.F.,1997). In practice however, no residential consumers have ever had their service reduced for non-payment in the D.F.. This is in contrast municipalities such as Monterrey in the north of Mexico, where residential consumers who fail to pay have their supply severely restricted as a matter of routine.

#### IV. DESIGN OF THE REFORM

In this section we examine the design of the reform. (In practice, as we will show in the following section, the reform that was actually implemented differed in important ways from the original plans.) We begin with a discussion of the re-organization of the sector, then we examine the design of the contracts and how this was affected by sectoral and political constraints and finally we discuss the bidding and selection process.

##### ***IV. 1. Organizational Structure for Regulation and Operation***

As noted above, the national water sector reforms decentralized responsibility for regulating water and sanitation to the state level, with the creation of state water commissions. Responsibility for the administration and regulation of water resources at the national level in Mexico now rested with the National Water Commission (CNA), which the Salinas administration created in 1989 to oversee reforms in the sector across the country. It is the CNA, for example, that takes a primary role in planning and administering major, interstate, bulk supply works; and that licenses, proposes the tariffs, and collects charges for the abstraction of water from all water sources including wells in the D.F.

*CADF, Comision de Agua del Distrito Federal.* CADF was created in July 1992 as the agency responsible for the administration, operation and maintenance of the infrastructure necessary for the provision of water, sewerage and drainage services within the D.F.. Its responsibilities overlapped with those of existing agencies, particularly the treasury, DGCOH and the *delegaciones*. In the decree creating CADF these overlaps were recognized and the relevant organizations are instructed to work with CADF and “very slowly” transfer their responsibility to it. CADF was initially placed under the Secretary of Finance but in 1994 (i.e. while reforms were being implemented) it was transferred to the Secretary of Works and Services. Therefore the immediate effect of the reform was to add yet another organization to the administration of the sector as can be seen in Table 6.

**Table 6: Administrative Arrangements in the Water Sector Post-reform (1997)**

Agency	Responsibility	Reports to
DGCOH	Construction and maintenance of primary water and sewer networks	Secretary of Works and Services (DF)
<i>Delegaciones</i>	Construction and maintenance and operation of secondary water and sewerage networks.	Secretary of Government (DF)
CADF	Oversees contractors who are responsible for meter installation, meter reading and billing	Secretary of Finance (92-94) Secretary of Works and Services (DF) (94-present)
Treasury	Collections and transfer of budget to other entities	Secretary of Finance (DF)

CADF, upon its creation in 1992, took over the billing of the 20,000 largest users, who were mainly industrial or commercial entities. These customers represented only about 2% of the consumer base and consumed an estimated 20% of total volume, but they accounted for 53% of all collections.<sup>25</sup> They were targeted because they were easy to identify, measure and enforce payment upon. This policy largely ignored the residential users who were responsible for about 75%<sup>26</sup> of water use in the D.F., and therefore failed to encourage a more rational use of water among most customers.

#### **IV. 2 Private Sector Contracts**

(i) *Contract Design* The chosen reform was a gradual one that did not immediately involve any major challenge to the existing sector agencies. Nonetheless, the stated objectives were ambitious: billing all customers based on metered consumption; optimizing the use of resources; achieving cost recovery; reduction of aquifer extraction; improving the overall efficiency of the water sector; and achieving sustainable improvements in services quality. These goals were to be achieved through ten-year service contracts with private consortia. The service contracts were expected to improve the financial performance of the city's water system through more efficient billing and collection and by reducing physical losses (water produced but not delivered to customers) from an estimated 37 percent to 24 percent of total production over the life of the contracts.

<sup>25</sup> Interview with Director General of CADF, 1997

<sup>26</sup> From DGCOH, 1997b.

Mexico City was divided into regions or “zones,” each of which would be let under a separate contract. In each zone, a private consortium would be awarded a ten-year service contract.<sup>27</sup> The reasons for this were two-fold: to promote a spirit of competition among the contractors and to reduce the risk of contract failure should a single contractor renege on the requirements of its contract. The number of zones was not decided at the beginning of the process although the bidding documents did state that at least two zones would be awarded. The contractors were asked to bid on the assumption that they would service at least a quarter of the population in the D.F. and they were instructed to include a table of discounts and surcharges in case they were assigned larger or smaller zones. The zones were to be roughly comparable in terms of population and have a minimum number of customers.

The contracts consisted of a “menu” of tasks involving the operation and maintenance of the secondary water distribution and drainage systems, as well as several other associated activities, such as opening customer service centers. The tasks were grouped into three stages and the D.F. provided each of the bidders with a detailed work program complete with a projection of volumes of each operational task by *delegacion* and semester for each of the ten years of the contract period. The consortia were expected to perform all of the tasks on the menu by the time the contract period ended. Prior to performing any of the tasks CADF must issue a specific execution order. The private consortium for a given zone would have the right of first refusal to execute orders in its zone. This allowed the D.F. to sole-source a number of relatively small batches of work over time that otherwise would have been required by law to go to competitive tender. This was a conscious decision on the part of the designers for three reasons: (i) to give the contractors revenue security so they would undertake the other requirements that did not lend themselves to short term contracting (i.e. customer service); (ii) to avoid the high transactions costs associated with public bidding without sacrificing competition entirely; and most importantly, (iii) to progressively move responsibility for all operations and management of the secondary network to the private sector (field interviews).

---

<sup>27</sup> Federal law required each private consortium to be majority owned by domestic Mexican companies, which in the case of water paired up with a private international water company. According to the bidding documents, the Federal Law for the Promotion of Mexican Investment and Regulation of Foreign Investment requires that power to determine management and control rests with a domestic company. This requirement is backed by the Constitution.

The tasks in the contracts were grouped into three stages:

***Stage 1: Initial Activities***

- mapping of the secondary water distribution network
- completion of a customer census
- installation of meters for all customers

The objectives of Stage 1 were to obtain reliable information on users and the state of the distribution and drainage network and provide both operators and consumers with complete and reliable information on consumption levels.

***Stage 2: Customer-Oriented Tasks***

- regularization of billing (meter reading, maintenance and the sending of bills)
- shared role in collection of bills
- establishment of customer care centers and telephone care centers
- connect new customers

The objectives of Stage 2 were to increase revenues, raise consumer consciousness about the careful use of water and the punctual payment of bills, and ensure billing of all customers.

***Stage 3: Network-Oriented Tasks***

- operation and maintenance of the secondary water and drainage networks
- detection and repair of visible and invisible leaks (water and drainage)
- rehabilitation and extension of the secondary network (water and drainage)

The objectives of Stage 3 were to improve the efficiency and quality of water distribution and drainage service to consumers, recover water previously lost through leaks, and reduce operating costs.

In the first two stages of the contract the consortia are not directly exposed to commercial risk, since payments are on a fee-for-service basis. In the third stage some degree of performance-based remuneration was planned.

The contracts did not set out a firm timetable for progression through these stages. However, according to the calendar of tasks used for bidding, stage 1 would begin at signing and run for two years, stage 2 would begin approximately one year later and run to the end of the contract, and stage 3 would begin approximately two years into the contract, and also run for the remainder of the contract. The planned schedule is illustrated in Figure 5.

**Figure 5: Schedule for Implementation of Contractual Stages**

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
First Stage										
Second Stage										
Third Stage										

*source:* CADF

(ii) *Influence of Politics on Reform Design.* The reforms were intentionally designed so that the more politically controversial objectives would only be addressed in the later stages. All of the key actors involved with the reform decision maintain that this gradual approach was the only politically viable option (field interviews).<sup>28</sup> Gradualism had many advantages from the government's point of view. It allowed the new sectoral oversight body, CADF, time to build itself up while it was still non-threatening to more powerful interests who were expected to oppose later stages of the reform. Gradualism was also electorally convenient. The new contracts could be signed with large domestic firms, helping to assure their support in upcoming elections. At the same time the later stages of the reforms, where the contractors take over responsibilities for system operations and were likely to make a significant number of people employed by the *delegaciones* redundant, were not scheduled until after the 1994 Presidential elections.

The decision to design a staged reform can also be explained by the PRI mindset at the time. The reformers never seriously considered the possibility that the PRI would not be in control of the D.F. government within the foreseeable future and therefore felt little pressure to ensure that reforms were completed quickly (Field Interviews). The

<sup>28</sup> There might have been non-political explanations of this decision but they seem unlikely. It was not due to lack of technical capacity to design and implement a more complex form of contract since complex contracts already existed in Mexico City. DGCOH had contracted out the operation of several water treatment plants. Lack of information was a problem, but this alone would not necessarily constitute a barrier to a more immediate reform, as had been shown by the concession in Buenos Aires in 1992.

decision to leave the implementation of the more difficult parts of the reform to future administrations, ultimately had significant costs, which we discuss in greater detail in section VI.

### IV.3 *The Transaction*

(i) *The Selection Process.* CADF issued a request for proposals in November 1992; bids were submitted in February 1993; a decision was made on the winning bidders in March 1993; and the contracts were signed in September 1993.<sup>29</sup>

Although the pre-qualification criteria and basic parameters of the contract were clearly specified, the number of zones was not decided upon until after the bids were received.<sup>30</sup> Bidders submitted price lists for each of the required actions in each of the 16 *delegaciones*. These detailed prices, as well as discounts and surcharges for zones larger or smaller than  $\frac{1}{4}$  of the D.F., were then fed into a computer model, developed by CADF, which computed the net present value of the cost of the actions for different numbers of zones and different allocation of zones across bidders. The model was then solved to minimize costs, which dictated the selection of a single private partner. The choice of four zones was not, therefore, a direct output of the model. Rather, the model was used to identify the costs associated with using different numbers of zones, to identify the best configuration of the zones, as matched with alternative private partners.<sup>31</sup> None of the bidders interviewed had a very clear idea of how the modeling process worked.

There were seven bids in total. The winning consortia and the zones in which they operate are set out in Table 7 below. The losing consortia were GMD (Mexico) and Biwater (UK), Tribasa (Mexico) and Thames (UK), and Geo (Mexico) and Aguas de Barcelona (Spain).

---

<sup>29</sup> CADF did not draw on external advisers to assist in the preparation of the contracts, nor did they consult widely with the major sectoral stakeholders, the DGCOH and *delegaciones*. They did hire Price Waterhouse to examine the financial portions of the bids submitted and make sure that all bidders complied with the rules for bidding so that all prices were strictly comparable. (Ochoa, 1998)

<sup>30</sup> Criteria included a requirement for a majority domestic presence in the bidding consortia, a minimum capital of 100 billion pesos, and technical capacity and relevant experience in urban infrastructure provision in Mexico or overseas.

<sup>31</sup> Informed sources report that the models calculations indicated that including 3 zones would not raise costs dramatically above 2 but there was significant pressure to include a fourth company. While this was more expensive than 3 zones it was done. Field interviews, 1997-98.



**Table 7: Allocation of Service Contract Zones**

<b>Zone</b>	<b>Company</b>	<b>Consortium Partners</b>	<b>Connections (Treasury list 1992)</b>	<b>Delegations</b>
<b>A (North)</b>	Servicios de Agua Potable (SAPSA)	Grupo ICA (Mexico); Compagnie Generale des Eaux (France)	373,350	Gustavo A. Madero Azcapotzalco Cuauhtemoc
<b>B (North-Central)</b>	Industrias del Agua (IASA)	Socios Ambientales de Mexico (Mexico); Severn Trent (UK)	362,750	Venustiano Carranza Iztacalco Benito Juarez Coyoacan
<b>C (South-East)</b>	Tecnologia y Servicios de Agua (TECSA)	Grupo Bufete Industrial (Mexico); Lyonnaise des Eaux Dumez (France)	311,490	Iztapalapa Milpa Alta Tlahuac Xochimilco
<b>D (West)</b>	Agua de Mexico (AMSA)	Grupo Gutsa (Mexico); United Utilities (UK)	293,270	Alvaro Obregon Cuajimalpa Miguel Hidalgo Tlalpan Magdalena Contreras

**Source:** Compiled from CADF Documents

Each of the task prices was supported by a breakdown in the expected direct costs, indirect costs and profit. The bidders were asked to offer unit prices for each of the specified tasks, which would be adjusted for inflation over the course of the contract.

(ii) *Bidding Strategies and The Pricing of Risk.* In order to determine their bids, the bidders had to price a basket of risks and responsibilities that were hard to calculate and to compare.<sup>32</sup> In each stage the contractors were obliged to carry out a number of actions for which they could not charge a fee directly and these costs had to be figured into the direct costs for which the contractor could charge a fee. Each consortium also had to evaluate the probability that they would, in fact, be allowed to carry out (and therefore charge for) each action in each stage. For example, in stage two, the contract states that contractors will be paid a separate fee for each of the following actions: a) meter reading, b) meter maintenance c) emission of bills and d) new connections. Regardless of whether these actions go forward, the contractors are obligated to: a) open a customer service center for each 50,000 customers in their zone, b) establish dedicated phone service lines

<sup>32</sup> The bidders took quite different approaches to pricing their bids; some did detailed preparatory work to determine the costlier *delegaciones*; others took rough approximations (for example, bidding higher fees for *delegaciones* built on rocky ground); while others bid uniformly.

and c) receive and process payments. Thus the weighted probability of the basket of actions would then determine the amount of indirect costs that would be associated with each action. In essence this required an assessment of credibility for each of the promised actions in each of the stages of the contract.

Because the first stage involved uncontroversial actions-- updating the user registry, mapping the system and beginning the installation of meters -- there was little doubt that execution orders would be issued during this stage. In the second and third stages, however, this was not true, and the various consortia appear to have estimated and priced these risks differently. This variation in the pricing of risk, combined with different technology choices in the case of one contractor, led to wide variations in the prices bid for any given action. For example, one of the actions on the menu was fixing a household leak including replacement of up to 1.5 meters of pipe, one contractor quoted a price of 673 pesos while another quoted 1,866 pesos (CADF, 1998). Because the bids were evaluated on the net present value of the total estimated package over the ten years of the contract, these variations in the prices of individual works were not critically examined. As we will see in section VI, this would lead to criticism and political problems in the future.

## **V. IMPLEMENTATION EXPERIENCE**

The D.F. reforms, as initially designed, were modest in scope -- beginning with a very limited role for the private sector in the delivery of discrete services associated with improved billing, building over time to include some operation and management functions associated with the reduction of physical losses in the distribution network. Modest as these plans were, the reforms as actually implemented were even more constrained. Initial start up delays slowed implementation of this gradual reform even more than expected, making unpopular changes more vulnerable to renegeing. Weakness in the regulatory environment, particularly in sectoral coordination and the tariff setting process, has also affected outcomes. Finally, the original contracts were renegotiated in 1998, which has, in effect, changed their nature entirely from the original design. We first discuss the delays, then coordination and broader regulatory problems and finally the renegotiation.

## *V 1. Delays*

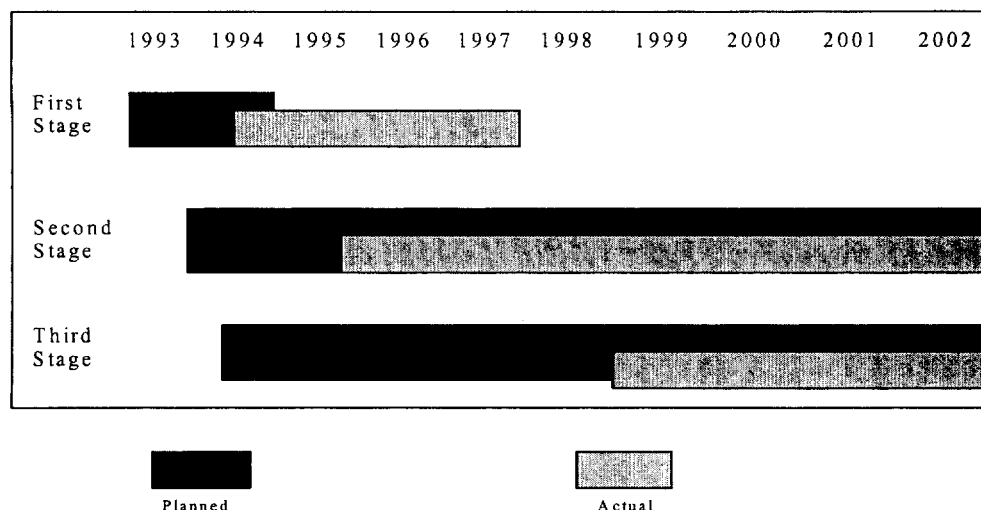
The reform was subject a number of delays. Although the winners of the bidding were chosen in March of 1993, the contracts were signed only in September of 1993 and the contractors did not begin operations until May of 1994. These delays were then compounded when the opposition party took power in 1997 and moved to renegotiate the contracts, as we describe in section V 3.

There may have been a delay at the outset because of a contract dispute, although accounts differ. According to Diaz, 1997, Ochoa, 1998 and some field interviews, the GMD/Biwater consortium disputed the contract award claiming that they should have been chosen over one of the other consortia. However GMD representatives declined to discuss the matter and all high level officials interviewed, including the ex-Mayor and the ex-Secretary of Finance, claimed to have no knowledge of the dispute (field interviews). A second factor in the delay was the need for the CADF to work out, internally and with the contractors the operational details of how the individual execution orders would be issued and paid.

Political factors, however, were a more important source of delay. As noted above in section III 2, Mayor Camacho was one of the leading contenders to become the PRI presidential candidate and fully expected to be chosen. He had little incentive to jeopardize his base of support within the D.F. by pushing ahead with reforms that might antagonize powerful allies and strong labor unions at the time of the selection of the PRI's candidate in 1993. As it turned out, on November 28, 1993 President Salinas announced that Donaldo Colosio was the official PRI candidate, and Mayor Camacho resigned the next day. This abrupt departure led to further delays until a new Mayor could be appointed.

The devaluation of the peso in December 1994 led to further delays. Specifically, the companies dramatically slowed meter installation because the budget which had been allocated for the purchase of imported electronic meters by the D.F. government was insufficient at the new exchange rates. In total these early setbacks meant that by 1997 the program was at least two years behind schedule (see Figure 6). As we discuss in V3 below the renegotiation of the contracts in 1998 led to still further delays in implementation of stage three of the contracts.

**Figure 6: Revised Schedule for Implementation of Contractual Stages**



## ***V 2. Regulation: Monitoring, Coordination and Tariff Setting***

(i) *Monitoring and Coordination.* The absence of a clear and effective set of monitoring and enforcement arrangements in the D.F. has had an important effect on the implementation of the contracts. CADF is the closest thing to a regulator, since it designed and monitors the service contracts, although it does not set tariffs. Although the decree that created CADF implied it would have wide oversight responsibility for the sector, it did not assign CADF the power to enforce its decisions. Rather, CADF was added to the existing organizations in the sector (DGCOH, Treasury and the *delegacion* water departments). As we will see in section VI this has resulted in significant overlap and lack of coordination.<sup>33</sup> CADF has a more straight forward role vis-à-vis the private contractors. It assigns and monitors (or hires an experienced company to monitor) the execution orders and must verify the work before the private contractor is paid by the Treasury. It may assess penalties for unsatisfactory performance although this seems not to have been a significant factor to date.<sup>34</sup> Confusing relations further is that fact that

<sup>33</sup> One example of this is the fact that DGCOH, the *delegaciones* and the contractors all maintain team to repair reported leaks. Field interviews revealed that frequently teams from two or more organizations show up at the same site to repair a reported leak.

<sup>34</sup> While we were unable to get reliable information from CADF on the extent to which they used penalties, contractors reported that being penalized was commonplace. Contractors maintained that many of the fines were of low value and for very minor infractions and they thought that a better approach would be to fine for significant failing in performance.

CADF is in some ways in competition with the private operators. CADF reads the meters of and bills approximately 20,000 large users and operates its own customer care center. Approximately 65% of CADF staff are absorbed in this activity, which it does not plan to transfer to private contractors.

CADF's lack of budget autonomy (its budget is part of the budget of the D.F.) can hamper the efficient implementation of works by the contractors. CADF's budget is expected to cover both the operating costs of the CADF and the service fee payments to the private contractors. All payments from clients and to contractors go through the D.F. Treasury, hence CADF does not receive any direct benefit from increases in collections. As a result of this arrangement when CADF funds were short because it had not received its budget allocation from the D.F. Treasury, which was common in 1996-97, it compensated by not issuing new execution orders (field interviews with contractors).<sup>35</sup>

All of the contractors agreed that they could have accomplished much more if they had been given longer term and more comprehensive execution orders. Typically an execution order is good for only about two months and when it expires the contractors should, in theory, wait for another to be issued before carrying out more work. They point out that many of the tasks they are performing (billing, collection, customer service) are processes and not discrete actions and it would be costly for them stop when the current execution order expires. It is therefore not uncommon for contractors to continue to carry out work and meet the expenses associated with that work without a contract, waiting several weeks or even months before a new execution order is issued and they are paid.

CADF's lack of authority in managing the sector has also meant that responsibility could not be shifted to the contractors as planned. For example, the CADF has never signed an execution order for new connections, an activity originally planned for Stage 2. Instead new connections have remained the responsibility of the *delegaciones*. CADF claims that new connections must first be relinquished by the *delegaciones* before responsibility can be assigned to the contractors (field interviews). The failure to pass this action to the contractors means that the newly connected customers do not receive water bills (as the information about those new connections is

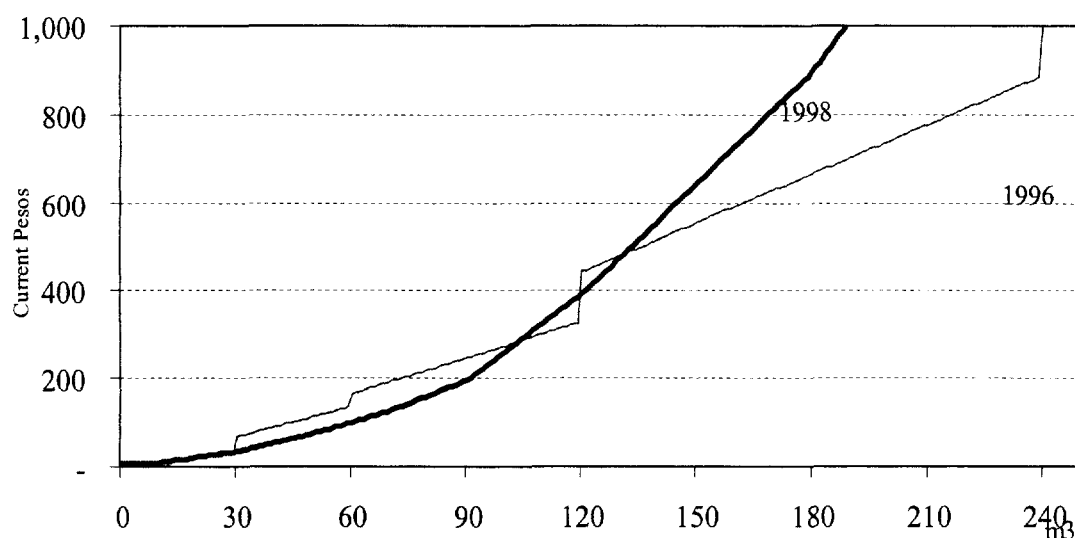
---

<sup>35</sup> By late 1998 most of the contractors said that delays had been minimized and that this was no longer a significant problem. Field interviews 1997-98.

not passed on time or not passed at all to the contractors) and that there are fewer revenues from execution orders to finance the costs they cannot directly bill, which has caused financial difficulties for at least one contractor.<sup>36</sup>

(ii) *Tariffs*. Tariffs are proposed by CADF but decided on by the D.F. Assembly and although all tariffs were increased in the early years of reform, they have since fallen for most residential users. As Figure 7 shows, between 1996-1998 the metered tariff fell even in nominal terms for users consuming between 30-100 m<sup>3</sup> per bimester, these are predominately residential consumers in the middle and upper classes. In real terms Figure 8, an even larger group of consumers, all those using between 30 and 220 m<sup>3</sup> per bimester or about 52.2% of all residential consumers, have seen 1998 tariffs substantially lower than in 1996. It is difficult, however, to know exactly how many customers actually noted these changes however because so few customers received bills based on actual meter readings in 1996 (most “metered” bills were actually based on historical readings, not actual readings).

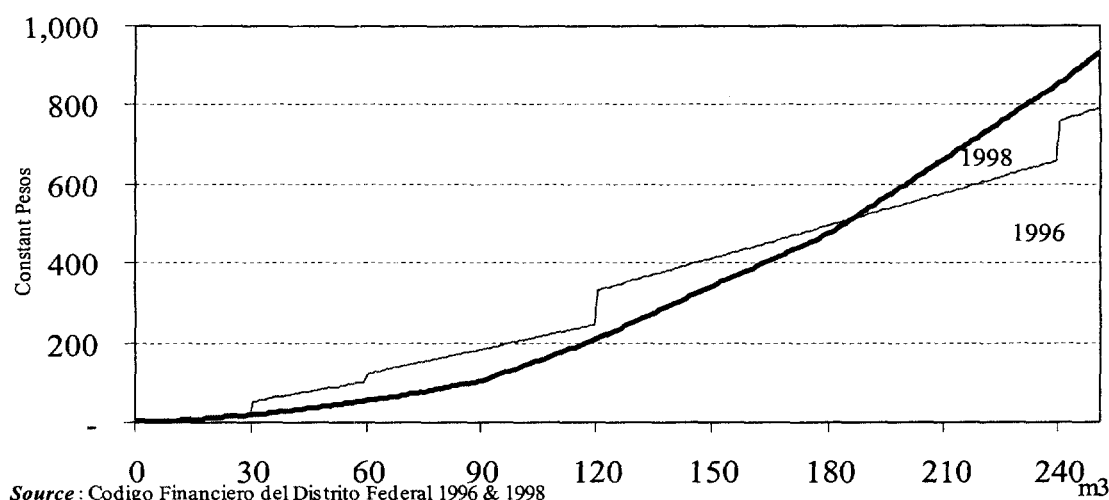
**Figure 7: Residential Metered Tariffs in D.F. 1996-1998 (Current Pesos)**



Source: Codigo Financiero del Distrito Federal 1996 & 1998

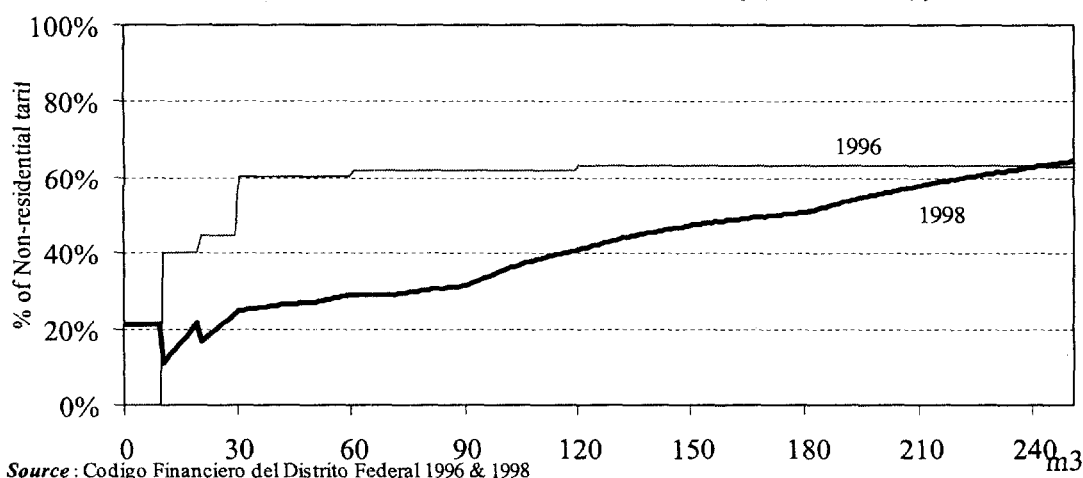
<sup>36</sup> The contractor in question was by far the most aggressive in pricing its bid. While this made them number one in the bid assessment it has meant that they are working on a substantially narrower margin than their competitors and therefore are much more susceptible to financial difficulties due to the lack of implementation of any given action in the contract. They have reportedly lost millions of dollars due to this problem during the second stage.

**Figure 8: Residential Metered Tariff in D.F. 1996 & 1998 (Constant Pesos)**



This tariff reduction for metered residential customers was combined with an increase in the cross subsidy from non-residential to residential consumers. Numerous documents, including water bills and public reports produced by the CADF and the DGCOH refer to this lowering of rates as a boon to residential consumers.<sup>37</sup> At the same time non-residential consumers have faced steadily rising prices in real terms in each revision, leading to the growing price differential shown in Figure 9. Since non-residential consumption accounts for roughly one-quarter of total consumption, average real metered prices have dropped.

**Figure 9: Residential Metered Tariffs as a Percentage of Non-Residential Metered Tariffs (1996 vs 1998)**



<sup>37</sup> DGCOH, 1997a. CADF water bills 1997.

Two factors explain the fall in real metered water tariffs in this period. First, in December of 1994 the peso was devalued, eventually falling to about 50% of its former value against the dollar. Because the 1995 water tariffs had been set earlier in 1994 they did not keep pace with the high inflation that occurred post devaluation. In an effort to limit the fall in real prices the D.F. assembly (controlled by the PRI) approved a large rise in the water tariff for 1996. By the time the new rates came into effect in 1996 the economy had entered a steep recession and any price rises were extremely unpopular. As we pointed out above, in 1996 most residential consumer's meters were not regularly read. Thus the combination of the price changes and receiving bills based on actual usage (which was often much higher than "historical" readings) meant that many consumers perceived a large price shock. This in turn contributed to the second factor affecting prices, the increasing politicization of tariffs. The D.F. Representative Assembly was granted the power to approve (and modify) the D.F. budget, including proposed water tariffs, in 1994. Although the PRI had a majority in the Assembly the public outcry over the tariff change following the devaluation increased the Assembly's sensitivity to raising tariffs. Politically, it was difficult for representatives to the Assembly to justify a rise in water tariffs during a period of rising inflation, falling wages and diminishing purchasing power. For example, in real terms the minimum wage fell by 19% and the average manufacturing wage fell by 24% between 1994 and 1996 (World Bank, 1998). The assembly, and the PRI more generally, became more sensitive to this in the run-up to elections in July of 1997. (For a more complete discussion see section VI.5). As a result tariff setting has been more subject to intervention and, since 1996, the Assembly has routinely adjusted tariff structures proposed by CADF. In most cases the assembly has allowed the non-residential rates to rise while keeping residential rates below inflation leading to real declines in residential tariff rates.

### ***V 3. Renegotiation***

Implementation of the contracts was severely disrupted by the entry of the first democratically elected, and opposition led, government of the D.F.. When the new PRD administration took power in December 1997 they were very skeptical of the contracts. Initially, they believed that the contracts had not been properly designed. There was a serious risk that the new government might try to cancel the contracts altogether. After a careful and critical review, the new administration decided to maintain the contracts but amended the parameters of stage three (see details below) and, more significantly, revised the prices applicable to the execution orders in the third stage.



As noted above, the bidding process had resulted in significant variations in prices between contractors for the same works. This was considered unacceptable by the new Government, which initially attempted to renegotiate all of the prices. A majority of the contractors (although not all) refused to re-negotiate prices for on-going works such as metering and billing, but did agree to review prices for stage three, which had yet to start. The new administration obliged all bidders to charge what was considered as a market rates and coincided in most cases with the lowest bidder's rates on nearly all actions already in the contract for stage three, and set prices for new actions that they wanted to add.<sup>38</sup> Reportedly, the administration took the position that the general contract simply gave the contractors the right of first refusal for new actions and that they could either accept these new prices or see the work contracted out to third parties.<sup>39</sup>

As a result of the re-negotiations stage 3 progressed but it is highly unlikely that the contractors will be given full control of operations and maintenance of the secondary network as originally envisioned. Instead the new administration chose to use the contractors to supplement existing organizations to improve the system by making them more active in leak repair and in upgrading or repairing the secondary network on a fee-per-action basis. In other words, the spirit of the original stage three - more responsibility of the private sector for improving operations - has now been lost. New actions have been added, but since these are on a fee-per-action basis they do not redistribute risk and reward between the public and private actors.

---

<sup>38</sup> This was true for most, but not all, actions. In at least one case the government agreed to prices above those of the lowest bidder. The implication being that the bidder severely underestimated the actual cost of the work in their original bid. However the government did not allow this low (below cost) bidder to collect the newly agreed price for the action, but instead insisted they be reimbursed at the price they bid originally, despite the fact that the government agreed to a higher price with the three other consortia.

<sup>39</sup> This does appear to be the stipulation in the bidding documents ("base de licitacion").

## **VI. REFORM OUTCOMES**

One of the objectives of the reform was to increase information on the customer base; another was to raise the economic viability of the system through expanded metering, better billing and higher rates of collection, which would help curb consumption and raise revenues. A third important objective was to improve the incentives of the operators to raise the quality of service delivery to consumers, to recover water previously lost through leaks, and to reduce operating costs. As we have seen these objectives were to be accomplished by progressively passing more responsibility to the contractors so that, by the third stage of the contract, they would be responsible for all operations and maintenance of the secondary water and drainage networks, including detection and repair of visible and invisible leaks, and rehabilitation and extension of the secondary network. During this phase it was intended that remuneration of the contractors would move to efficiency-based payments based on a combination of their operating and system efficiency (i.e. reductions operating costs and in UfW) and their collection efficiency. As we will see, however, none of these responsibilities have been passed to the private contractors and the evidence to date shows that there has been little improvement in either quality of service or operational costs and that cost recovery has scarcely improved.

In this section we analyze the impact of the reforms on information, metering, billing and collection, service and efficiency of operations. Then we examine the way in which politics contributed to these outcomes. Since the reform is still underway our conclusions about the outcomes are necessarily provisional

### ***VI 1. Information***

One important accomplishment of the contracts was to improve information about the water distribution system and the client base in the D.F.. Thanks to the contracts, the D.F. now has an electronic map of the entire water system for overall planning, a customer census that has allowed regularization of previously unregistered connections and meters for most customers.

It seems reasonable to attribute the information improvements to the contracts since earlier efforts to use the existing government agencies to improve information,

register customers, expand metering and read the meters once installed had failed. The dispersion of authority across numerous public agencies and the entrenched nature of their workforce had made reform difficult. The split in responsibilities between the *delegaciones*, which connected customers, and the D.F. Treasury, which billed them, allowed many customers to be added to the system but not to the registry. The participatory programs described earlier added to the problem by extending semi-formal connections in many poor neighborhoods. Moreover, although prior to the contracts up to 53% of registered consumers had meters, because of technical problems and corruption most users paid a flat fee or were billed on "historical" meter readings (field interviews).

The water census, completed in 1996, yielded an average increase in existing, although still unregistered, connections of about 22% (Table 8). The increase in registered connections was far from uniform across the city and the large variations show the extent of the information deficit that existed previously, particularly in the South-east (Zone C) where one out of every three connections was not registered.

**Table 8: Changes in Registered Connections and Metered Billing**

Company	Zone	Treasury List (1992)	CADF (Aug 1998)	% change in total number of registered users	Connections billed on metered basis (Aug. 1998)	% of total with metered billing
SAPSA	A (North)	373,350	410,681	10%	316,020	77%
IASA	B (North-Central)	362,750	411,269	13%	314,838	77%
TECSA	C (South-East)	311,490	446,249	43%	167,159	37%
AMSA	D (West)	293,270	346,605	18%	258,785	75%
CADF	Large Users	NA	19,689	NA	13,576	69%
		1,340,860	1,634,493	22%	1,070,378	65%

Source: CADF

## **VI.2 Metering, Billing and Collection**

Nearly 1.2 million meters were installed as a result of the reforms (Table 9). As of June 1998, 64% of customers were billed on a metered basis while another 16% were billed the average of the metered customers in their zone.<sup>40</sup> This is a major improvement on the pre-reform state of affairs where, because of the large number of unregistered

<sup>40</sup> The D.F. financial code states that once metering has reached 70% in a given zone then the remaining un-metered customers can be billed for the average metered use in the zone.

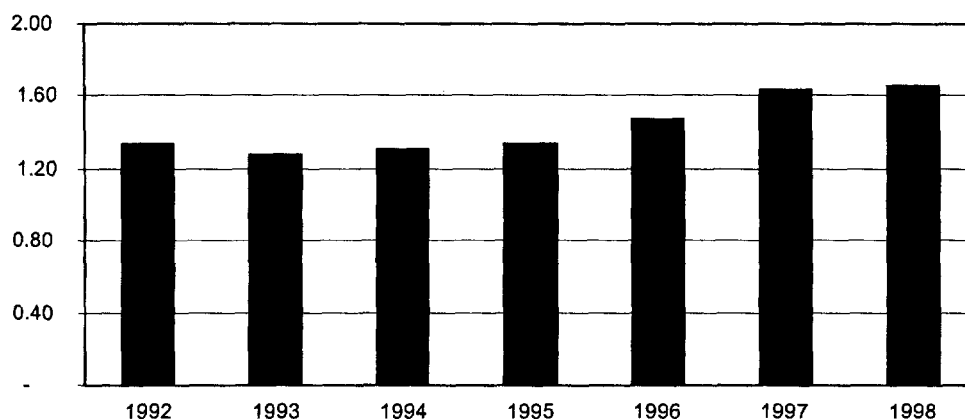
connections, at least 22 percent of customers did not receive a bill at all and those that did were being billed a fixed rate, irregardless of usage. Again the South-Eastern zone, which is the poorest and has the lowest water and service quality, has experienced serious difficulties in metering and billing, as of August, 1998 only 37 percent of their customers receive a metered bill (Table 8). To address previous technical problems and corruption, the new meters can be read electronically and are less subject to failure.

**Table 9: Installation of Meters**

Year	Number of Meters Installed		Total Cumulative Number of Meters Installed
	Type A	Type B	
1993	-	-	1,699
1994	168,007	45,903	215,609
1995	189,365	20,108	425,082
1996	177,779	134,665	737,526
1997	196,438	117,036	1,051,000
Mid- 1998	38,909	66,548	1,156,457

Source: Author estimates based on data provided by CADF and Secretaria de Obras y Servicios

**Figure 10: Bills Issued (millions of bills)**



Source: Patron de Tesoreria and CADF

Billing has improved substantially since meter reading and billing was taken over by the contractors under CADF (Figure 10), with total number of bills growing by about 26% over the period. The amount billed has also risen, by 205% in nominal terms.

Despite these improvements, information on payment of water bills is still poor, a result of the sector's fragmented administration. Customers can pay their water bill at one of the 24 customer centers run by the contractors, one of the Treasury's offices or one of hundreds of designated bank branches. Only the Treasury is in a position to aggregate payment data for the entire system. For about a year after the contractors began taking over billing there was no information sharing arrangements and contractors sent out bills but had no idea which customers actually paid at the Treasury's offices or at the banks. Only in late 1998 did the Treasury begin sending information on receipts to the contractors. Unfortunately, this information is still received late and continues having many problems originating from mistakes in the manual capture processes of the Treasury so that many payments cannot be matched with the corresponding receivables.

Although the reforms did much to improve billing, they did little to increase the incentive for bills to be collected. The private companies are paid only for producing and sending out the bills, not for collecting money; although they have put effort into reminding and encouraging customers to pay. While their efforts have helped somewhat, the responsibility for collection still rests with the D.F. Treasury. Not surprisingly, Treasury's incentive is to maximize the District's resources. Since the Treasury collects all taxes and fees levied by the District government, it focuses its attention on the single largest source of revenue, general taxes. General taxes, particularly property and payroll taxes, accounted for 25% of total revenues in 1996. In contrast, revenues from water collection were only 5% of revenues that year. Also not surprising is the fact that the Treasury has always focused its efforts in water collections on the very large customers who provide high returns to their collection efforts (Ley de Ingresos, 1995). This lack of significant improvement has led the CADF to institute its own program to help collect past arrears, sending letters to people who owe more than 500 pesos, but it is too early to know how effective this will be.<sup>41</sup>

This separation of responsibilities and misalignment of incentives has meant that total collections have barely improved. Although in nominal terms collections increased by over 150% between 1994 and 1998 (Figure 11), they have increased by only 7% in real terms over the same period (Figure 12). The collection rate (total collected / total billed) has actually fallen during the reforms (Table 10) reflecting the increased billing activity

---

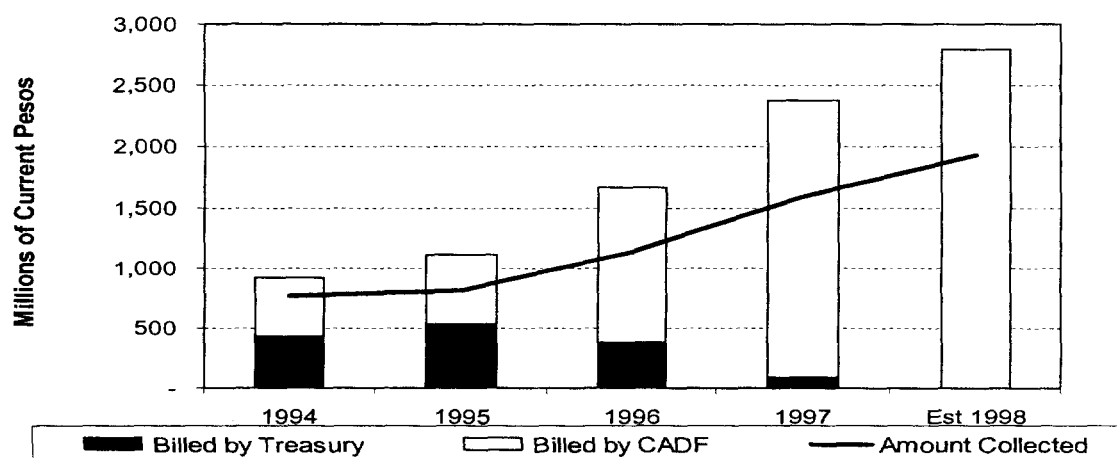
<sup>41</sup> The response to over 300,000 letters sent in July 1998 suggests that only about 3% of outstanding arrears were paid, in part because 40 to 50% of the customers turned out not to be in arrears.

of the private contractors which has not been matched by the public sector agencies in charge of collection.

**Table 10: Collection Ratio 1994-1998** (Thousands of Pesos)

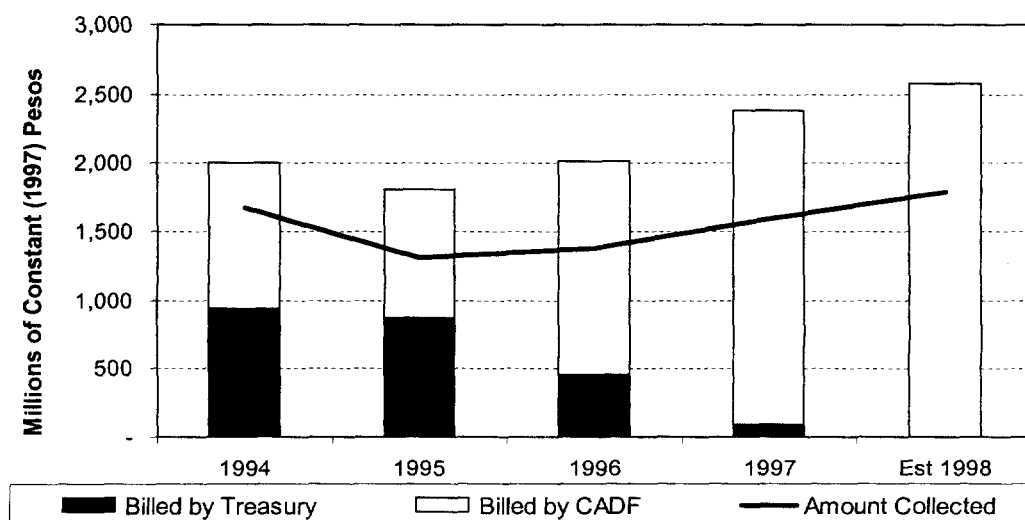
Year	1994	1995	1996	1997	Est. 1998
Total Billed	914,844	1,115,375	1,667,476	2,376,804	2,787,472
Total Collected	766,000	807,521	1,140,000	1,589,701	1,930,240
Collection Rate	84%	72%	68%	67%	69%

**Figure 11: Amounts Billed and Collected (Current Pesos)**



Source: Computed with data from CADF & Treasury. Contractors included in CADF.

**Figure 12: Amount Billed and Collected (Constant Pesos)**



Source: Computed with data from CADF & Treasury. Contractors included in CADF.

### VI.3 Service

The effect of the contracts on service has been mixed. The contractors expanded the number of customer centers, and respond more rapidly to questions on billing and meter readings or to reports of leaks or lack of water. Furthermore, the operators have opened a total of 24 customer service centers and each has telephone hotlines in their area (Ochoa, 1998).

Service problems remain, however, including poor quality of water and interrupted service, especially in the southern and southeastern portions of the city. As we saw above the reliability of water services is still the responsibility of the *delegaciones*; hence the contractors have had little effect on this aspect of service, which has not improved markedly. Even by 1998, neighborhoods in nine of the sixteen *delegaciones* continued to suffer routine cuts in service, although the severity of the problem and the number of people affected varied widely. We can illustrate the problems by examining two of the worst affected *delegaciones*, Tlalpan and Iztapalapa. In Tlalpan 43 out of 192 neighborhoods received water only two to three days a week usually for eight to ten hours a day; an estimated 30% of the population were affected (DGCOH, 1998 and field interviews). In Iztapalapa about 40% of the population were affected by the cuts; some received water as infrequently as one day a week for as little as 6 hours (field interviews).

In addition to the poor service in these sections of the city the quality of the water is also extremely poor. In part this is due to the ground water in the area which has high concentrations of manganese but in part it is also because the Southeastern section of the city is the last to receive water brought in from the Cutzamala system. The combination of frequent interruptions in supply and poor quality local water means that the water delivered is often of very poor quality and in some sections of the southeast residents have to run their tap for several minutes before using the water as it initially runs black due to the high sediment content. To combat these problems the DGCOH was implementing a plan to treat water at the well-head in these locales and there is a longstanding plan to extend the southern branch of the Cutzamala aqueduct to the southeast of the city.

A related effect of such poor service is to reduce revenues. Because of interruptions in service and the poor quality of the water many of these customers are charged on a fixed rate, regardless of the fact that many also have meters, in line with CADF's policy of not introducing metered billing where service quality is poor. The flat rates are set according to the income tax classification of the area and for most of the affected areas is between 11.75 and 17.65 pesos per bimester.

#### **VI.4 Operating Efficiency**

(i) *Sector Management.* The reforms did little to change the organization of the sector, and fragmentation of administration of water services remains a serious problem. As shown in Table 6, CADF and the private operators were simply added to the existing organizations operating in the sector. Although the initial decree that created CADF gave it wide sectoral oversight powers, it did not give it any powers of enforcement over the existing organizations, nor did it change the organization or responsibilities of these organizations (DGCOH, Treasury and the *delegacion* water departments). As a result there continues to be significant overlap, duplication and lack of coordination, which, in turn, lead to inefficiencies in the use of resources.<sup>42</sup>

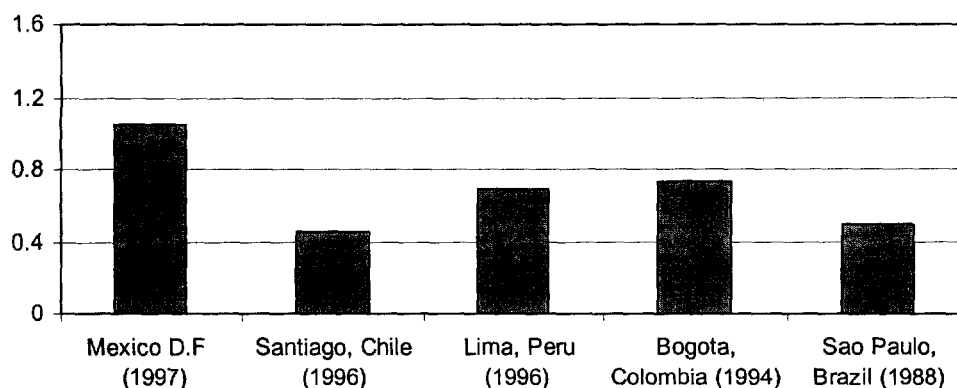
The inability or unwillingness of successive D.F. governments to unify and streamline the many public agencies in the sector or to link budgetary resources to clear efficiency indicators has blunted their ability to use private sector participation to improve efficiency. Since the reforms effectively added the private contractors to the existing agencies, they have not resulted in cost savings. As a proxy for administrative efficiency we examined the working ratio (operating costs/operating billed revenues) of the system. As can be seen from Figure 13, the D.F. compares unfavorably with a range of water systems in Latin America.

---

<sup>42</sup> One example of this is the fact that DGCOH, the *delegaciones* and the contractors all maintain teams to repair reported leaks. Field interviews revealed that frequently teams from two or more organizations show up at the same site to repair a reported leak.



**Figure 13: Comparison of Working Ratios for Various Countries**

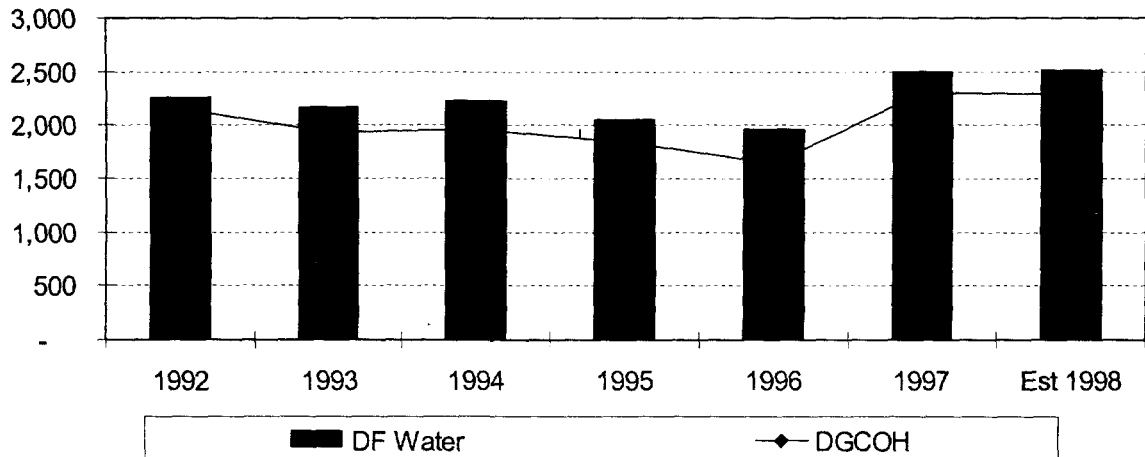


**Source:** for Mexico, Author's Calculations; for Santiago, EMOS; for Lima, SEDAPAL; and for Bogota and Sao Paulo, Yepes and Dianderas 1996

(ii) *Operating Costs.* Not surprisingly, operating costs have not decreased as the reformers intended; rather they have increased in real terms over the reform period (Figure 14). The budgets of the DGCOH and the *delegaciones* were not significantly affected by the reforms, and the DGCOH accounted for an average of 90% of the total operating budget in water from 1992 to 1998 (Figure 14). Hence, it would be unrealistic to expect costs to fall when the largest entity in the sector has not been required to reduce its operating budget over the reform period.<sup>43</sup> Since the contractors have not yet been given the operational responsibility envisioned for Stage 3 in the original design of the contracts, there is little time left to correct the situation and achieve any significant reduction in operating costs in the rest of the project time frame.

<sup>43</sup> There were some reductions in the water budget in 1995-96, but these were in response to problems caused by the devaluation and were not sustained.

**Figure 14: Operating Costs of the D.F. Water System**  
(Millions of Constant 1997 Pesos)



**Source:** DGOH, CADF & Delegations

*NOTE: Operational Costs includes Labor Services, Materials & Supplies, General Services, Aid/Subsidies & Transfers and Consumer/capital goods. It does not include the money expend in the account "Public Works" as this was considered an investment rather than an expense.*

(iii) *Cost Recovery.* Since costs did not fall and tariffs did not increase, it is not surprising to find that the system still does not cover its operating costs, although the level of cost recovery did improve modestly from 64% in 1993 to 71% in 1998 (Table 11). Because the water system is financed as part of the government budget rather than on a commercial basis and all loans and financial charges are handled directly by the D.F. Treasury, we do not have full information on the total outstanding debt or interest charges. We cannot, therefore, examine how far the system is from generating enough revenues to recover all costs including debt service, and provide a reasonable return on investment.

**Table 11: Operational Cost Recovery in the D.F. Water System, 1993-1998**  
Thousands of Current Pesos

	1992	1993	1994	1995	1996	1997	1998
Revenue Collected	471,400	596,000	766,000	807,521	1,140,000	1,589,701	1,930,240
Operating Expenses	878,252	926,544	1,017,073	1,262,310	1,624,505	2,494,149	2,709,792
Operational Cost Recovery Ratio	54%	64%	75%	64%	71%	64%	71%

Operational Cost Recovery Ratio= Operating Revenue Collected/Operating Expenses

## ***VI.5 Influence of Politics on Outcomes***

As we saw above in section three, the reform design was shaped by political considerations, but political pressures became more pronounced during the course of implementation and hence affected outcomes. As a result, reform steps that would have been politically challenging in the best of circumstances, were even more difficult to implement. In this section we will quickly re-state the potential winners and losers from the reforms as proposed then we present a chronological examination of events which helps to reveal the ways in which the changing political environment affected the reforms.

The potential winners from reform were: a) private companies (domestic and foreign) who might win a contract; b) residents who were unconnected or had minimal service, and might expect expanded and/or improved service; c) connected customers whose service might improve and who valued those improvements more than any price increases; and d) national politicians who might benefit if the federal Treasury made fewer transfers to the D.F. water system, and thereby freed resources they could use for their constituents. Potential losers included: (a) current customers whose costs from increased prices might outweigh the value placed on improvements in service; b) employees and heads of existing public sector agencies who might be laid off or lose stature or benefits and; c) politicians who might lose the ability to reward supporters with jobs, investment contracts or increased water services.

Importantly the political gains or losses associated with the reforms would accrue at different points in time. With the exception of the private companies, potential winners would only be rewarded in the medium to long term as the reforms progressed. Therefore they might not be aware of the potential gains (e.g. unconnected customers) or would heavily discount the expected gains which may or may not actually accrue in the future. Although potential losses to most groups also accrue in the medium to long term, these groups are much more likely to be aware of the threat to their interests and actively seek to block further reforms which might threaten them. It is this interaction between potential gains and losses and the immediate needs of the political parties that allows us to track the effects of politics on the reforms.

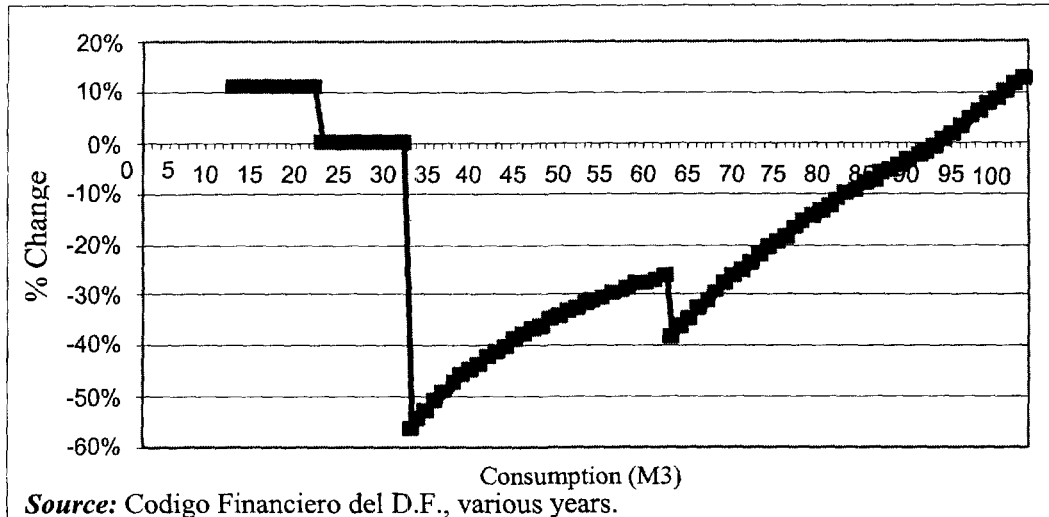
*A political economy timeline of reform.*- In mid-1993, one year prior to a general election, the PRI controlled government of the D.F. chose to contract four private firms for water services. The choice of four contracts (as opposed to 2 or 3) was politically

determined (see IV.3). It stands to reason that CADF came under pressure to issue four contracts because there were political benefits associated with them that were important to the PRI heading into an uncertain election. By announcing the award of contract (and signing them in September) the PRI was able to quickly capture the benefits from contracting, support and, possibly, contributions from large private firms, while not materially affecting any of the potential losers. The contractors did not begin operations until May 1994, just two months before elections. In July 1994, the PRI was victorious in presidential elections.

In December 1994, a planned devaluation went awry and the country entered a severe economic recession. With inflation running at 35 percent in 1995 the PRI controlled D. F. Assembly passed an increase in residential water rates for 1996 of over 50 percent in an effort to avoid large drops in the real tariff rate. When the new water tariff became effective in 1996 the recession was at its peak and the rise was highly unpopular leading to vocal criticism from existing customers, particularly since services had not improved.

In 1996, facing elections in the D.F. Assembly and the first ever directly elected mayor of Mexico City as well as both national legislative bodies in 1997, the PRI changed tactics. Abandoning fiscal rectitude, the D.F. Assembly voted for a large cut in water tariffs for the middle and upper middle class. The tariff cut seems particularly driven by the new political dynamics in the D.F.. By early 1996 it was clear that the major threat to the PRI in the D.F. is the left wing PRD which is especially strong among lower income groups. If the water tariff decision in the D.F. is any indication, it appears that the PRI consciously decided to abandon the fight for the lower income voters and concentrate instead on voters in the middle to upper income brackets who they feared might also defect to the PRD (Figure 15). In fact metered rates for the poorest consumers (less than 20 m<sup>3</sup>) actually rose, while those consuming 20-25 m<sup>3</sup> had no change. The rise in price for the poorest metered consumers was mirrored by price hikes of about 19 percent in the same year for non-metered residential customers, the majority of whom were lower income. In contrast wealthier metered customers, those consuming between 35 and 75 cubic meters per bimester, receive large price reductions, even more than the price rises of the year earlier.

**Figure 15: Residential Metered Tariff Change, 1996-1997 (current pesos)**



In the same time period, 1996-97, the D.F. government made a series of decisions that delay the consolidation of sector management under CADF as foreseen in the original reform plans. The main reason for this was the fear that the resulting unemployment would be very costly politically. For example, the government chose not to implement portions of the second stage of the contract (e.g. passing new connections to contractors) and further delayed the passage of operation and maintenance to the contractors. Both of these reforms were expected to result in labor redundancies in the *delegaciones*. In an already tight political contest the government had no desire to antagonize public labor unions and add to already increased unemployment.

In the event however, none of these moves were enough to keep the PRI in power in the D.F.. In July 1997, the PRD won the D.F. elections by a landslide taking the mayoral seat and a commanding majority in the D.F. Assembly. The first ever election for Mayor in the D.F. is, however, only one of a series of changes planned in the movement to fully representational local politics. The full plan is to move to local election for municipal mayors (*Delegado's*) in stages between 2000-2003. As a result of the transitional arrangements, the first Mayoral term in office is shortened to just three years from the usual six and the Mayor will face reelection in 2000. Beginning in 2001 the municipal mayors will be elected in each of the 16 *delegaciones*. This means that the current government has little incentive to push reforms, since they will incur significant

up-front political costs, in terms of lost jobs in the public sector, but deliver gains only in the long term.

In this context the PRD renegotiate the third stage of the contract, profoundly altering the role of the private sector in the reform plan. Under the renegotiated terms the contractors have been used up to now only to supplement the public agencies (i.e. detect and repair leaks, carry out system maintenance, etc) not supplant them. In this way the PRD protects itself from accusations of causing unemployment while still seeking to improve the service in the water sector. It also leaves the *delegacion* water departments as a useful political tool in terms of employment and politically motivated service delivery.

Barring an unforeseen attempt to create a centralized, autonomous sector administration, the political changes over the next few years will almost certainly further fragment administration of the water system. Since some districts routinely vote for one of the three main parties (PAN, PRD, PRI) it is likely that different *delegacion* water systems will be run by rival political parties. This may politicize water issues even further and make it more difficult to delegate responsibilities to the private sector.

#### ***VI.6 Accomplishments and Failings of the Contracts***

Although the outcomes discussed above were far less than intended, the D.F. was still better off with the private contracts than it had been before. The private contractors produce much better information on the customer base and they install and read meters with greater accuracy and more consistency, they bill more customers more accurately and they are more responsive to consumer complaints. It seems unlikely that even these modest changes could have been achieved without private participation. Prior attempts to reform the public agencies in the water sector had had no success, and there was little political will for a reform that would have required restructuring and unification of the government agencies in the sector.

The contracts failed to address some of the most serious problems of the sector, however, and the prospects that these will be tackled in the future are few. The reform failed to improve efficiency, reduce costs, raise revenues or curb waste. And, as we discuss in the next section, serious water resource issues and equity problems remain.

## **VII. Beyond the Reform: Unresolved Key Policy Issues**

The reform planned – and, even more so, the reform implemented – in Mexico City was very partial in scope. As described above, it was not expressly designed to tackle the most serious water resource problems confronting the city, though as originally planned it would have had an important effect in curbing excess consumption and waste. Similarly while the reform, at least as planned, was intended to increase efficiency in service provision, which might have been expected to improve both service quality and cost options for all segments of society, it was not specifically intended to improve the lot of the poorest of the city's citizens – who also happened to be those with the poorest services at the time of the reform. With these provisos in mind, this section considers some of the incremental effects of the reforms as implemented on these broader policy issues. We first consider its consequences for the negative externalities from water consumption and water pollution, second, we consider its effects on the poor.

### ***VII.1 Social Costs of Water Consumption***

The reform did little to change the incentives of residential consumers to conserve water, despite its high opportunity cost in the D.F. The increasing rate of overexploitation of the aquifer was reduced, but this appears to have been partly accomplished by simply failing to meet expanding demand.

Overexploitation of the aquifer has been recognized as a problem since at least the 1930s. It has generated a number of negative externalities, including:

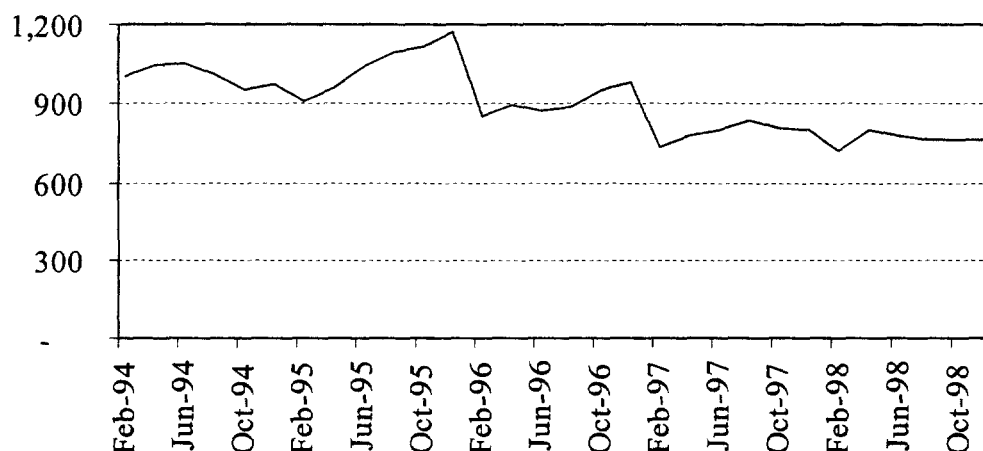
1. The cost to building owners of damage to their property from subsidence due to over extraction;
2. The cost to government of damage to public infrastructure (roads, pipes, etc) from subsidence due to over extraction;
3. The cost to future generations of current unsustainable use manifest through higher costs in the future or diminished quality of life
4. The cost of forgone use of water by the surrounding communities whose water is being taken to the D.F.
5. Raising the cost of nearby communities due to higher pumping costs caused by the lower water tables (hence deeper wells) which are the result of overexploitation by the D.F.

These costs have never been calculated for Mexico City, but as we will show, they are probably very high, much higher than the prices charged by the municipal system.

The period of the reforms did see a slowing in the growth in production of bulk water from the aquifer, but not as a result of any change in residential demand. Between 1988 and 1998, total water produced by the D.F. water system remained almost unchanged at about 35 m<sup>3</sup> per second, despite a rise in population of an estimated 650,000 people over the decade. This, combined with a policy of substituting water from Cutzamala for ground water, reduced the rate at which water was pumped out of the aquifer from 23.5 m<sup>3</sup>/second to 19.1 m<sup>3</sup>/second. This reduction in pumping, however, is still not enough to stop the subsidence of the city. The poor data available on consumption patterns make it difficult to pinpoint the exact source of this reduction, but it appears to be the result of a reduction in *non-residential* demand combined the failure to meet rising residential demand.

As we have seen the tariff rate for large metered users (who are mainly non-residential) increased by nearly 65% in real terms between 1991-1998, at a time when real prices for residential users, who are responsible for three quarters of consumption, were falling. This non-residential price rise, combined with the effects of a severe recession in 1995-96, appears to have reduced non-residential demand. Thus, estimated average consumption for the 20,000 largest users dropped by twenty percent from 1994 to 1998 (Figure 16).<sup>44</sup> This translates into over 23 million cubic meters per year or about .74 m<sup>3</sup> per second.

**Figure 16: Average Consumption of Large Users 1994-1998**



*Source* : Author's Calculations using CADF data.

<sup>44</sup> The implied price elasticity of demand is well within the estimates found in numerous demand studies. For a good summary of these studies see Abdala, 1996.



Although the state of the data makes measurement difficult there is little reason to expect that residential water demand declined during this period, given that real prices were falling. Rather, a growth in rationing and an expansion in the proportion of the population with lower propensity to consume probably explain much of the flat level of production not explained by the drop in non-residential consumption. Much of the D.F.'s population growth has been in the southern districts, which have lower per capita consumption in part because they have the highest rate of rationing of water and in part because they are poorer and hence are less likely to have gardens, washing machines, multiple bathrooms, etc. From 1990 to 1995 (the last year of available statistics) the population of the northern and central *delegaciones*, which have much higher per capita consumption of water, shrunk by nearly one percent per year, while the southern *delegaciones* grew by an average 2.7 percent per year (INEGI 1997).

The most important reason for the failure to make further progress in curbing consumption is that water tariffs were far less than the opportunity cost of water. We have already shown that water tariffs did not cover operating costs, although it can be argued that operating costs were much higher than those of an efficiently operated utility. We can illustrate how far tariffs were from the economic cost of water by using the charges CNA applies for extraction right from private wells, which are based on a 1989 study by the CNA of the relative scarcity of water and its alternative uses. In 1997, for example, the CNA charged private well operators 7.96 pesos per m<sup>3</sup> that they pumped out of the aquifer, while the DGCOH paid only 0.14 pesos per m<sup>3</sup>, or less than two percent of the private cost. The discrepancy is not especially surprising in that the charges, while proposed by the CAN, must be approved by Congress. Since most of the water system operators are still owned and run by publicly owned municipal companies or departments, a rise in the charge to public operators would mean a rise in the operating budgets of these public entities and a consequent rise in consumer prices or government subsidies.

If we assume that the price CNA charges the private users is a reasonable proxy for the real economic cost of water from the aquifer in the D.F. (and according to CNA it is probably an underestimate), then we can compare the economic cost of water from the aquifer with the price paid by the public sector. That calculation yields an effective subsidy of over 4.7 billion pesos in 1997 (Table 12), more than the entire budget of all the D.F. water agencies that year. If we add to this the CNA's estimate of the economic cost of water from other sources (Cutzamala or Lerma), then the total subsidy rises to over 8

billion pesos. If we further assume that operating costs and physical losses (which are about 37 %) remain constant, then the average tariff would have to rise to 15.3 pesos per m<sup>3</sup>, or about US\$ 1.93 at 1997 exchange rates, to cover costs. In contrast the actual average tariff (calculated as revenues billed divided by m<sup>3</sup> water produced minus physical losses) in 1997 was 3.4 pesos m<sup>3</sup> or about US\$0.43.

**Table 12: Financial and Economic Costs of Raw Water in the D.F., 1997**

Difference in the Financial and Economic Cost of Raw Water in the D.F. , 1997						
Source	Production (1997) (millions m3)	Public- Sector price (97 pesos)	Economic Price (97 pesos)*	Public-sector cost (millions pesos)	Economic cost (millions pesos)	Difference
Wells	603.6	0.14	7.96	84.5	4,804.6	4,720.1
Cutzamala	313.5	1.42	7.96	445.1	2,495.2	2,050.1
Lerma	154.2	0.85	7.96	131.1	1,227.5	1,096.4
Springs	25.5	.14	7.96	0.0	25.5	25.5
Total	1,096.8			664.3	8,730.7	8,066.4
Weighted Avg.		0.61	7.96			

\* as estimated by CNA.

To understand the importance (and the economic cost) of the current high rate physical losses (37 percent) we re-calculated the prices that would have to be charged if losses fell to 20 percent. The price that would then need to be charged to cover the economic cost would fall from 15.3 pesos to 12 pesos. To look at it another way, if physical losses could be reduced to 20 percent this would lead to a saving of over 186 million cubic meters per year or 5.9 m<sup>3</sup> per second. This is more than the current Cutzamala extension project is bringing to the city at a cost of over 500 million dollars. However, as long as the D.F. administration does not itself face the full cost of developing and transporting new external water supplies to the city – or the full costs associated with subsidence in the city from over-use of the aquifer – the incentives to pursue such savings are likely to remain weak.

## ***VII.2 Costs of Wastewater and Sewage Disposal***

The disposal of wastewater is a second issue that was not directly addressed by the reforms – and remains a major problem for the city. The sewerage system contributes

about 26-28 m<sup>3</sup> of wastewater per second, which is equivalent to 75-80% of the total water produced (Joint Academies, 1995).<sup>45</sup> There are 21 treatment plants around the D.F. with a nominal capacity of 5.9 m<sup>3</sup>/second. In 1997 these functioned at an average of 50.8% of capacity or about 3 m<sup>3</sup>/second, which suggests that just over 10% of all wastewater was treated. The treated wastewater is used mainly for the watering of public parks (83%), as well as some industrial and commercial uses (12%) and a small amount for irrigation (5%). The remaining 90% of the wastewater is pumped north, out of the D.F. and into the state of Hidalgo where it is used to irrigate 80,000 hectares of farmland.<sup>46</sup> This state of affairs leads to two problems, the negative health effects of irrigation with untreated sewage and pollution of an abundant water source.

*Health Effects.* In 1991 the federal government, recognizing the health risk of irrigating with untreated sewage, banned the practice for surface crops or crops that are eaten raw. This legislation reduced the health threat, but it violated the principal that the polluters should pay for the cost of dealing with their pollution to give them an incentive to pollute less. It passes some of the cost on to consumers in the form of higher prices for these foods. Although some of these consumers may be in Mexico City, the source of the pollution, they are unlikely to be aware of the link between untreated wastewater and food prices, so it would not affect their willingness to pay for sewage treatment. The rest of the cost is borne by farmers who either have to invest in new crops or find clean water to irrigate the same crops. These farmers, who are not even in the same state, are unlikely to have much influence over the D.F. policy towards sewage treatment. Finally the failure to treat the D.F. sewage means that the rivers and streams that receive the runoff are still polluted, which is a threat to the health of people who live near these waters and use them for drinking, fishing, bathing and washing clothes.

*Pollution of Water Sources.* The failure to treat the wastewater has consequences for the aquifer as well. Because the D.F. drainage system combines the runoff from rainfall with sewage, storm runoff cannot be used to recharge the aquifer. Since Mexico City is located at the bottom of a valley, much of the city is naturally predisposed to flooding. As a result the thousands of cubic meters of rainwater which fall on the city

---

<sup>45</sup> Because the drainage system in the D.F. is combined (i.e. sewage and storm water) the amount of wastewater produced fluctuates dramatically depending on the season.

<sup>46</sup> Joint Academies, 1995 and DGCOH, 1997a.

during the rainy season (up to 120 m<sup>3</sup>/second) is pumped out of it out of the city at great cost.

The DGCOH has carried out studies of ways to improve the system's capacity to treat and reuse water as well as to recharge the aquifer through injection wells or to recharge reservoirs and has developed medium to long term plans to increase treatment and recharge. Without a proper accounting of the economic costs of water usage and a rise in consumer tariffs to cover these costs, however, it is unlikely that such efforts will have much effect.

### ***VII.3 Effects on the Poor***

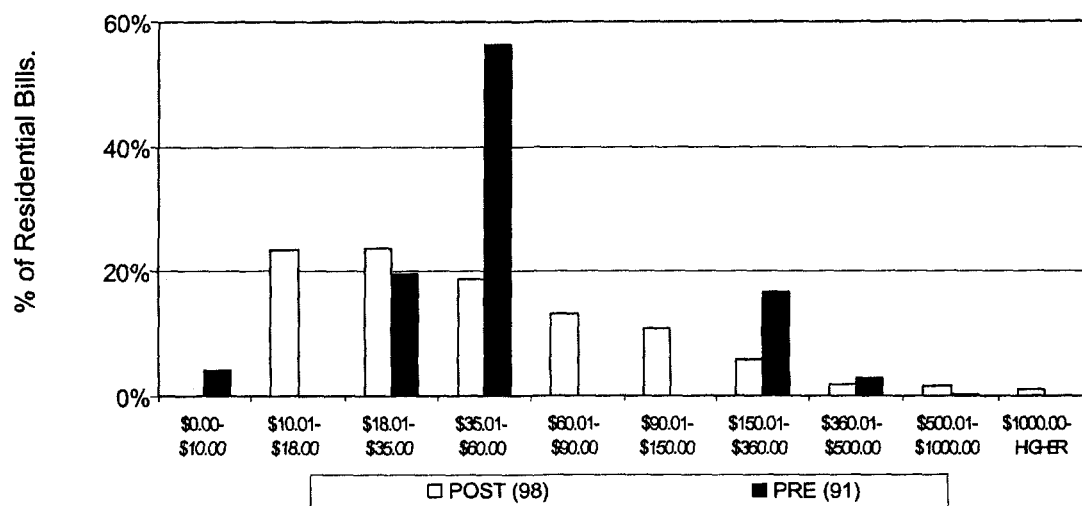
While we cannot measure the income effects of the reforms directly because of the poor state of the data, we can extrapolate their impact on people in different socio-economic strata by examining how their water bills changed due to the reforms. We can also draw some inferences about the extent to which changes in bills were accompanied by changes in service quality. Briefly, the primary effect of the reform in this context was to improve the efficiency of billing (which, for the prevailing tariff structure, meant an increase in bills for some poor households), without offering any significant compensatory improvement in service quality – or the promise of such improvements.

*(i) Effects by Socio-economic Group.* One of the effects of the reforms was to increase metering, which changed the size of consumer's bills as shown in Figure 17.<sup>47</sup> Prior to the increase in metering most bills bore little relation to consumption and instead were based on flat rates for different zones, those in the lowest tax zone (presumably the poorest) were not billed at all. As a result of the flat rates many consumers received similar bills despite highly varied consumption. For example, in 1991, 55% of consumers received bimonthly bills of between 35-60 pesos. In 1998 most bills were based on actual, metered consumption. As Figure 17 shows, this raised water bills for the lowest consumption levels, which are often (though not always) the lowest income levels, and left bills unchanged or lower for many of the middle and upper consumption levels.

---

<sup>47</sup> The 1991 data is based on the distribution of tax codes which determined the flat rate applicable to water consumption, while the 1998 data is from actual billings.

**Figure 17: Distribution of Residential Water Bills in the D.F., Pre- and Post-reform  
(% of households)**



*Source:* CADF and Author's Calculations using INEGI's data.

Service quality and consumption are both highly correlated with income in the D.F., since many of the wealthy who have high water consumption due to modern conveniences (multiple toilets, washing machines, swimming pools, etc) live in the central and western portions of the city which have good quality service. We can therefore illustrate how the reforms affected different socio-economic strata of society by examining three fairly homogeneous *delegaciones* that broadly represent the lower income/consumption (Milpa Alta), middle income/consumption (Azcapotzalco) and upper income/consumption (Benito Juarez) areas. Naturally, with areas this large it is impossible to categorize all people in the *delegacion* but the findings can be taken as broadly representative. Table 13 compares the costs of water for households in constant 1998 pesos for the pre and post reform periods. The pre-reform prices are calculated based on fixed charges by tax classification while post-reform prices are from 1998 billing data.

**Table 13: Changes in Real Household Bills, 1991-1998**

<b>LOW INCOME</b>					
<i>Delegation: Milpa Alta (100% Unmetered Connections In Jan/1998)</i>					
	AMOUNT BILLED (98 Pesos)				
	0	10.00-12.00	12.01-18.00	18.01-35.00	35.01- Over
PRE-REFORM (1991)	100%	-	-	-	-
POST-REFORM (1998)	-	100%	-	-	-
<b>MIDDLE INCOME</b>					
<i>Delegation: Azcapotzalco (81% Metered Connections And 9% Average Metered In Jan /1998)</i>					
	AMOUNT BILLED (98 Pesos)				
	10.00-18.00	18.01-35.00	35.01-60.00	60.01-150.00	150.01- OVER
PRE-REFORM (1991)	-	-	98%	2%	-
POST-REFORM (1998)	17%	26%	21%	28%	8%
<b>HIGH INCOME</b>					
<i>Delegation: Benito Juarez (81% Metered Connections And 19% Average Metered In Jan /1998)</i>					
	AMOUNT BILLED (98 Pesos)				
	10.00-18.00	18.01-35.00	35.01-60.00	60.01-150.00	150.01- OVER
PRE-REFORM (1991)	-	-	11%	70%	19%
POST-REFORM (1998)	12%	25%	27%	26%	11%

*Low Income Consumers.*

Consumers in Milpa Alta were billed about 12 pesos a month in 1998. This was a big change from 1991, because Milpa Alta is in the lowest rated tax zone, their tariff was zero. So for resident of Milpa Alta the change was to actually receive a water bill although it is still not related to their consumption. Milpa Alta, which remains completely unmetered, is an extreme example of the effect on most low income consumers. The majority of low income consumers were paying a flat rate of ten pesos per bimester prior to reform. For the most part these areas continue to receive non-metered fixed bills, hence it is unlikely that their consumption patterns have been affected by the reforms. The only noticeable effect of reforms in most poor areas is a rise in the number of people who actually receive a water bill.

*Middle Income Consumers*

If Azcapotzalco is any guide, the water bills for over 40% of middle income consumers were lower with the introduction of metering, while 34% faced modestly

higher bills. Our data do not tell us the extent to which bills went down because they were being overcharged before meters were introduced or because real prices declined.

### *High Income Consumers*

Similarly, many consumers in high-income areas such as Benito Juárez found that their water bill stayed the same or decreased in real terms. In Benito Juárez some 37% of consumers were paying 50-75% less in 1998 than they did in 1995.

(ii) *Affordability.* At current tariffs, piped water is likely affordable but not always available for the poor in the D.F. leaving many consumers to rely on more expensive sources. Using the 1998 tariffs, combined with census data, we estimate that non-metered water bills for even the poorest households with any reported income<sup>48</sup> would equal about 2 percent of their monthly salary – which is well within the bounds of any traditional definitions of affordability.<sup>49</sup> Our calculations for a metered household that consumed 15 m3 per month also equals just 2 percent of the monthly salary.<sup>50</sup>

However, the poorest sections of the D.F. are also the least well served by the current system in terms of the quantity of water, the quality of water and the continuity of service. For example, the *delegacion* water department in Iztapalapa estimates that they have a deficit of over one cubic meter per second, equivalent to 86,400 m3 per day of unmet demand (field interviews). We have already seen that interruptions in service are commonplace in poorer areas. To compensate for these deficiencies people in these areas substitute expensive bottled water for drinking or buy water from private water trucks. The cost of water from these vendors in September 1998 ranged between 33 and 66 pesos per cubic meter.<sup>51</sup> This is in contrast to the 1 peso per cubic meter price for all customers who use less than 10 cubic meters per bimester and a maximum of 20.3 pesos per cubic

---

<sup>48</sup> This includes only households that report income, obviously for the 3.9% who report no income any positive price is unaffordable.

<sup>49</sup> Using 1998 minimum salary and income (reported as number of minimum salaries) from the 1995 census and the lowest fixed tariff. We have assumed, conservatively, that a household had no more than one income earner.

<sup>50</sup> 15m3 was used because it is double the estimated minimum safe level of 50 liters per day (Joint Academies, 1995) assuming 5 member households which is the average in the D.F. There is also evidence that the poorest in the D.F. currently consume only 20 liters per day. (Joint Academies, 1995)

<sup>51</sup> The cost of a 6 m3 tanker in Iztapalapa in 1998 was between 200 and 400 pesos implying 33-66 per m3. Field interviews.

meter for residential consumers. To put it another way; the marginal cost per cubic meter for people in some of the poorest neighborhoods of the D.F. is between 64% and 228% higher than the marginal cost for the largest residential consumers.

In sum, then, there were a number of key policy areas in the sector which the reforms did not explicitly address, including resource scarcity, treatment of wastewater and improvement of access and quality of service for the poor. It is difficult to imagine any future reform being effective without dealing with these issues.

### VIII. CONCLUSIONS.

Although the reforms generated a significant amount of information about the system which has begun to replace largely fictitious “estimates” with real numbers, the overall impact on the sector has been very limited by comparison with the magnitude of the problems it faced. The main problems that existed prior to reform were not addressed: (i) fragmented, costly and inefficient administration of the water system resulting in high costs, poor service and low returns; and (ii) economically irrational pricing of water and pollution resulting in high levels of consumption and waste and low levels of treatment of waste water and low levels of reuse of treated water. Certainly these problems were institutionally and politically difficult to address – involving challenges to powerful interest groups (the existing agencies, labor, and consumers who had long enjoyed significantly under-priced water), and requiring fundamental and politically difficult decisions about water pricing. In addition, the D.F. itself had neither clear jurisdiction nor clear incentives for resolving the major problems of water resource and pollution management. The difficulty of reform has risen with the political changes of the mid-nineties, and is likely to rise further with the implementation of a fully democratic local government that could further fragment administration along party lines.

The service contract model used in Mexico City offers only low-powered incentives to the private partners to improve efficiency or service quality. The contractors assumed little to no commercial risk and receive no significant rewards or penalties based on their performance. The public agencies operating in the system had no incentive to work together, nor were their budgets based on clearly defined efficiency indicators. Moreover, the progressive shift of responsibility to the private operators envisioned in the



original contract did not happen, and is now highly unlikely. Accordingly, relatively few of the expected benefits will actually be captured.

The reforms also failed to exploit fully the opportunities for competition presented by the use of competitive bidding for the contracts, and the division of the city into four zones. Although the D.F. had the necessary ingredients for competitive bidding, the structure of the auction did not really use competition to reduce costs to consumers or motivate efficiency. The decision to choose four contractors on the basis of bids for actions which might never, and in the event will never, take place, meant that the bids were not strictly comparable. As a result the expected benefits of competition, particularly lower costs and more accurate information about prices, were not achieved. Since the zones were also not structured to be comparable, it is relatively difficult to use yardstick competition. In particular, the network in zone C in the Southeast is in worse repair than the others, and both water quality and service quality are much lower. Nevertheless, it might be possible to benchmark *delegaciones* from zones that share similar socio-economic and water system characteristics, such as Milpa Alta and Cuajimalpa, which are both rural, low density areas with low metering, and Benito Juárez & Cuauhtémoc, which are relatively wealthy, with high per capita consumption and a high degree of metering. If these comparisons could be tied to a system of rewards and penalties it would help improve performance. In practice, little attempt was made to take advantage of the potential for yardstick competition, or to identify ways of making legitimate comparisons between zones.

As political change progresses in the D.F. and each of the 16 *delegaciones* elects their own municipal Mayor it is likely to become more difficult to pass increased responsibility to private sector operators. The short length of the current administration (a half term of 3 years) is not conducive to implementation of politically difficult decisions. It is unlikely therefore that there will be any significant movement toward further reform until after 2003 when the current contracts will be ending in any case.

The experience of the D.F. suggests a number of lessons for policy makers elsewhere:

1. It is possible for a water system to be in a state of “crisis” for very long periods of time without triggering genuine reform, especially if water and wastewater services are not priced in accordance with their opportunity costs. This is largely because the

resource is not visible to the general public and therefore its increasing scarcity is not widely appreciated. This lack of knowledge makes politically costly reforms, such as price rises, extremely difficult.

2. Gradualist reforms that defer politically difficult decisions or leave them to future governments involve a high risk that the reform will not be implemented as originally intended.
3. Service contracts, which are often portrayed as a stepping stone to management contracts, leases or concessions, do not necessarily create circumstances that make further reform more likely. In fact, the experience of firms to date, particularly with politically motivated pricing and unpredictable re-negotiation, may actually make further private sector involvement less likely.
4. The use of bidding for the market – or the use of multiple zones – are not in themselves sufficient to sustain a competitive environment. For competitive pressures to be created and maintained, attention must be paid, first, to making the basis of the bidding highly transparent, and, second, to the development of clear benchmarks, and agreed processes for benchmark comparisons, and associated allocation of penalties and rewards.
5. Fragmentation of water system management among many, poorly coordinated, politicized public agencies makes reform much harder to implement and the realization of potential benefits less likely.
6. In the absence of prices that correctly signal the scarcity and cost of a resource, including the relative prices of treated to new water, attempts to change behavior will not succeed. The price signals must apply to all actors in the system, including governments, operators and consumers; thus, large central government subsidies to the local government will be a barrier to greater efficiency.

Thorough-going reforms aimed at achieving a more equitable and sustainable water delivery system in Mexico City would need to focus not only on major efficiency improvements in the operation of, and investment in, services within the city, but also, more broadly, on substantial reform to the way in which water resources are priced and allocated in the city and the surrounding region, as well as in the design, management and pricing of wastewater services. This would need to include reductions in federal subsidies for new production, higher prices for system operators as well as consumers, and large investments in the treatment and storage of wastewater. None of these changes

is likely without strong political leadership, both within the D.F., and in broader national water policies.

ANNEX 1.

Electoral Reforms in Mexico

Year	Reform	Result
1977	Reformed the Federal Law of Political Organizations and Electoral Process (LOPPE) by: <ul style="list-style-type: none"> <li>Increasing the number of majority districts for Federal Deputies from about 200 to 300 seats.</li> <li>Setting aside an additional 100 seats to be allocated to opposition parties on a proportional basis.</li> </ul>	This reform raised the level of opposition participation in the lower house from about 17% (1964-1976) to about 26% (1977-1985)
1982	President de la Madrid established new policy of accepting municipal-level right-wing (PAN) opposition victories but state-level victories still not allowed.	The acceptance of opposition control of municipalities was a large change but the de la Madrid administration would not accept electoral gains of left-wing parties in Oaxaca.
1986	President de la Madrid issues new electoral code. Basic changes include: <ul style="list-style-type: none"> <li>Winning party cannot obtain over 70% of total lower chamber seats.</li> <li>Proportionately allotted seats increased from 100 to 200. (total lower house increased from 400 to 500)</li> <li>Opposition can gain 40% of seats (200) without winning any majority districts.</li> <li>Party that gains largest number of majority seats must be given a simple majority of the lower house.</li> <li>50% of senate to be elected every 3 years (instead of whole senate each 6 years)</li> </ul>	More increases in representation of the opposition but they are given by the government not won at the ballot box.

Source: adopted from Camp 1996, with additions from Gomez Tagle 1993

## References

- Abdala, Manuel Angel. 1996. "Welfare Effects of Buenos Aires' Water and Sewerage Services Privatization." Mimeo
- Alonso, Jorge, Alberto Aziz and Jaime Tamayo, eds. 1992. *El Nuevo Estado Mexicano: III Estado, Actores y Movimientos Sociales*. Universidad de Guadalajara, Nueva Imagen y Ciesas, Mexico, D.F.
- Baer, M. Delal. 1993. "Mexico's Second Revolution: Pathways to Liberalization" in Roett, Riordan. ed., 1993. *Political and Economic Liberalization in Mexico: at a Critical Juncture?* Lynne Rienner Publishers, Boulder, CO.
- Bailey, John and Jennifer Boone. 1994. "National Solidarity: A Summary of Program Elements" in Cornelius, Wayne, Ann Craig and Jonathan Fox. eds. 1994. *Transforming State-Society Relations in Mexico*. Center for U.S.- Mexican Studies, University of California, San Diego.
- Basáñez, Miguel. 1993. "Is Mexico Headed Toward Its Fifth Crisis?" in Roett, Riordan. ed., 1993. *Political and Economic Liberalization in Mexico: at a Critical Juncture?* Lynne Rienner Publishers, Boulder, CO.
- Brook Cowen, Penelope. 1997. "Getting the Private Sector Involved in Water: What to Do in the Poorest of Countries?", Viewpoint Note #102, World Bank.
- CADF (Comision de Agua del Distrito Federal). 1997. Progress report, Mimeo.
- CADF (Comision de Agua del Distrito Federal). 1998. Progress report, Mimeo.
- Calderon Alzati, Enrique and Daniel Cazes, 1991. *Prontuario de Resultados: Elecciones federales de 1998*. Mexico DF
- Camp, Roderic Ai. 1996. *Politics in Mexico*. Oxford University Press, New York
- Centeno, Miguel Angel. 1994. *Democracy within Reason*. The Pennsylvania State University Press, University Park, P.A.
- Cornelius, Wayne, Ann Craig and Jonathan Fox. eds. 1994. *Transforming State-Society Relations in Mexico*. Center for U.S.- Mexican Studies, University of California, San Diego.
- Cornelius, Wayne, Judith Gentleman and Peter Smith. eds. 1989. *Mexico's Alternative Political Futures*. University of California, San Diego.

- Coulomb, Rene. 1989. "La Participacion Popular en la Provision de los Servicios Urbanos: Estrategias de Supervivencia o Practicas Autogestionarias?" in Schteingart, Martha and Luciano d'Andrea. 1989. *Servicios Urbanos, Gestion Local y Medio Ambiente* El Colegio de Mexico, Mexico.
- Crespo, Jose Antonio. 1994. "Dominacion y hegemonia en los sistemas partidistas dem Mexico y Japon" *Foro Internacional* XXXIV:3 , 437-456 Julio-Septiembre, 1994.
- DGCOH (Direction General de Construcccion y Operacion Hidraulica). 1994. *Agua 2000, Estrategia para la ciudad de Mexico*. Departamento del Distrito Federal.
- DGCOH (Direction General de Construcccion y Operacion Hidraulica). 1997a. *Compendio, 1997*. Mimeo.
- DGCOH (Direction General de Construcccion y Operacion Hidraulica). 1997b. *Plan Maestro de Agua Potable del Distrito Federal 1997-2000* Mexico, D.F.
- DGCOH (Direction General de Construcccion y Operacion Hidraulica). 1998. *Programa de Tandeos en las delegaciones del Distrito Federal*. D.F. Mexico.
- Dresser, Denise. 1994. "Bringing the Poor Back In: National Solidarity as a Strategy of Regime Legitimation" in Cornelius, Wayne, Ann Craig and Jonathan Fox, eds. 1994. *Transforming State-Society Relations in Mexico*. Center for U.S.- Mexican Studies, University of California, San Diego
- Gamboa de Buen. Jorge, 1994. *Ciudad de Mexico, una vision*. Fondo de Cultura Economica, S.A., Mexico, DF.
- Gomez Tagle, Silvia. 1993. "Electoral Reform and the Party System 1977-90" in Neil Harvey, ed., *Mexico Dilemmas of Transition*. Institute of Latin American Studies, University of London and British Academic Press, London.
- Haber, Paul. 1993. "Cárdenas, Salinas and the urban popular movement" in Neil Harvey, ed., *Mexico Dilemmas of Transition*. Institute of Latin American Studies, University of London and British Academic Press, London.
- Haber, Paul. 1996. "El arte de la reestructuración y sus implicaciones políticas: el caso de los movimientos urbanos populares" in Cook, Maria Lorena, Kevin Middlebrook and Juan Molinar Horcasitas. eds. 1996. *Las Dimensiones políticas de la reestructuración económica*. Cal y Arena, Mexico.
- Harvey, Neil. ed., 1993. *Mexico Dilemmas of Transition*. Institute of Latin American Studies, University of London and British Academic Press, London.

Instituto Federal Electoral (IFE). 1991. *Estadística de las Elecciones, Elecciones Federales de 1991*, Distrito Federal, Mexico, IFE.

Instituto Nacional de Estadística Geografía e Informática. 1997. *Distrito Federal Censo de Población y Vivienda*. (CD ROM). Distrito Federal, Mexico, INEGI

Joint Academies Committee on the Mexico City Water Supply. 1995. *Mexico City's Water Supply: Improving the Outlook for Sustainability*, Washington DC, National Academy Press.

Molinar Horcasitas, Juan and Jeffrey Weldon. 1994. "Electoral Determinants and Consequences of National Solidarity" in Cornelius, Wayne, Ann Craig and Jonathan Fox, eds. 1994. *Transforming State-Society Relations in Mexico*. Center for U.S.- Mexican Studies, University of California, San Diego

Klesner, Joseph. 1996. "Broadening toward Democracy?" in Randall, Laura. ed., 1996. *Changing Structure of Mexico: Political, Social and Economic Prospects*. M.E. Sharpe, Armonk, New York.

Lechuga, Jesus and Fernando Chavez, eds., 1989. *Estancamiento Económico y Crisis Social en México 1983-1988: Tomo II Sociedad y Política*. Universidad Autónoma Metropolitana, Distrito Federal, Mexico.

Lustig, Nora. 1994. "Solidarity as a Strategy of Poverty Alleviation." in Cornelius, Wayne, Ann Craig and Jonathan Fox, eds. 1994. *Transforming State-Society Relations in Mexico*. Center for U.S.- Mexican Studies, University of California, San Diego

Ochoa, Ontoniel. 1998. *El Cambio Estructural del Sector Agua del Distrito Federal 1992-1997* (mimeo)

Purcell, Susan Kaufman. 1995 "The Interdependence of Political and Economic Reforms in Mexico", SAIS Review, Winter-Spring, 1995

Ramirez Saiz, Juan Manuel, 1992. "Entre el corporativismo social y la lógica electoral. El estado y el movimiento urbano popular (MUP)" in Alonso, Jorge, Alberto Aziz and Jaime Tamayo, eds. 1992. *El Nuevo Estado Mexicano: III Estado, Actores y Movimientos Sociales*.

Reding, Andrew. 1989. "Mexico Under Salinas: A Façade of Reform" *World Policy Journal*; 6:685-729 Fall 1989.

Roett, Riordan. ed., 1993. *Political and Economic Liberalization in Mexico: at a Critical Juncture?* Lynne Rienner Publishers, Boulder, CO.

- Saade Hazin, Lilian. 1998. "New strategy in urban water management in Mexico: the case of Mexico's Federal District". Natural Resources Forum. Volume 22 Number 3. Elsevier Science. Great Britain.
- Schteingart, Martha. ed. 1997. *Pobreza, Condiciones de vida y salud en la ciudad de Mexico*. El Colegio de Mexico, Mexico, D.F.
- Schteingart, Martha and María Torres. 1997. "Políticas de agua y drenaje en la ciudad de Mexico, y su aplicación en las colonias estudiadas" in Schteingart, Martha. ed. 1997. *Pobreza, Condiciones de vida y salud en la ciudad de Mexico*. El Colegio de Mexico, Mexico, D.F.
- Teichman, Judith. 1995. *Privatization and political change in Mexico*. University of Pittsburgh Press, Pittsburgh, P.A.
- Vega, Edna. 1989. "Movimiento urbano popular en Mexico" in Lechuga, Jesus and Fernando Chavez, eds., 1989. *Estancamiento Economico y Crisis Social en Mexico 1983-1988: Tomo II Sociedad y Politica*. Universidad Autonoma Metropolitana, Distrito Federal, Mexico.
- Ward, Peter. 1989. "Government without Democracy in Mexico City: Defending the High Ground" in Wayne Cornelius, Judith Gentleman and Peter Smith. eds., *Mexico's Alternative Political Futures*. University of California, San Diego
- Wiarda, Howard. 1988. "Mexico: The Unravelling of a Corporatist Regime?", *Journal of Interamerican Studies and World Affairs*; 30: 1-28 Winter 1988-89.
- World Bank. 1997. *World Development Indicators*. CD ROM, Washington, DC
- World Bank. 1998. *Mexico: Enhancing Factor Productivity Growth*. Country Economic Memorandum, report number 17392-ME. Mexico Dept. World Bank.
- Yepes, G. and A. Dianderas. 1996. *Water and Wastewater Utilities: Indicators 2nd Edition*, Water and Sanitation Division, World Bank.



# Policy Research Working Paper Series

	<b>Title</b>	<b>Author</b>	<b>Date</b>	<b>Contact for paper</b>
WPS2628	Monopoly Power and Distribution in Fragmented Markets: The Case of Groundwater	Hanan G. Jacoby Rinku Murgai Saeed Ur Rehman	June 2001	P. Kokila 33716
WPS2629	Bridging the Digital Divide: How Enterprise Ownership and Foreign Competition Affect Internet Access in Eastern Europe and Central Asia	George R. G. Clarke	July 2001	P. Sintim-Aboagye 37644
WPS2630	Parallel Imports of Pharmaceutical Products in the European Union	Mattias Ganslandt	July 2001	L. Tabada 36896
WPS2631	Pension Reform in Hungary: A Preliminary Assessment	Roberta Rocha Dimitri Vittas	July 2001	L. Gross 37030
WPS2632	Human Capital and Growth: The Recovered Role of Education Systems	Sébastien Dessus	July 2001	K. Mazo 39744
WPS2633	Bank Privatization in Argentina: A Model of Political Constraints and Differential Outcomes	George R. G. Clarke Robert Cull	July 2001	P. Sintim-Aboagye 37644
WPS2634	Chile's Regional Arrangements and the Free Trade Agreement of the Americas: The Importance of Market Access	Glenn W. Harrison Thomas F. Rutherford David G. Tarr	July 2001	L. Tabada 36896
WPS2635	Optimal Use of Carbon Sequestration in a Global Climate Change Strategy: Is There a Wooden Bridge to a Clean Energy Future?	Franck Lecocq Kenneth Chomitz	July 2001	V. Soukhanov 35721
WPS2636	Processes, Information, and Accounting Gaps in the Regulation of Argentina's Private Railways	Javier Campos-Méndez Antonio Estache Lourdes Trujillo	July 2001	G. Chenet-Smith 36370
WPS2637	Technical Efficiency Gains from Port Reform: The Potential for Yardstick Competition in Mexico	Antonio Estache Marianela González Lourdes Trujillo	July 2001	G. Chenet-Smith 36370
WPS2638	On Financing Global and International Public Goods	Todd Sandler	July 2001	S. Kpundeh
WPS2639	Public Policy toward Nongovernmental Organizations in Developing Countries	William Jack	July 2001	H. Sladovich 37698
WPS2640	Where Has All the Foreign Investment Gone in Russia?	Harry G. Broadman Francesca Recanatini	July 2001	S. Craig 33160

# Policy Research Working Paper Series

	<b>Title</b>	<b>Author</b>	<b>Date</b>	<b>Contact for paper</b>
WPS2641	Is Russia Restructuring? New Evidence on Job Creation and Destruction	Harry G. Broadman Francesca Recanatini	July 2001	S. Craig 33160
WPS2642	Does the Exchange Rate Regime Affect Macroeconomic Performance? Evidence from Transition Economies	Ilker Domaç Kyles Peters Yevgeny Yuzefovich	July 2001	A. Carcani 30241
WPS2643	Dollarization and Semi-Dollarization in Ecuador	Paul Beckerman	July 2001	P. Holt 37707
WPS2644	Local Institutions, Poverty, and Household Welfare in Bolivia	Christiaan Grootaert Deepa Narayan	July 2001	G. Ochieng 31123
WPS2645	Inequality Convergence	Martin Ravallion	July 2001	P. Sader 33902
WPS2646	Foreign Direct Investment and Integration into Global Production and Distribution Networks: The Case of Poland	Bartłomiej Kaminski Beata K. Smarzyska	July 2001	L. Tabada 36896
WPS2647	The Politics of Monetary Sector Cooperation among the Economic Community of West African States	Chibuike U. Uche	July 2001	A. Al-Mashat 36414
WPS2648	Methodologies to Measure the Gender Dimensions of Crime and Violence	Elizabeth Sharader	July 2001	M. Correia 39394
WPS2649	The Impact of the AIDS Epidemic on the Health of the Elderly in Tanzania	Martha Ainsworth Julia Dayton	July 2001	H. Sladovich 37698
WPS2650	Sources of China's Economic Growth, 1952-99: Incorporating Human Capital Accumulation	Yan Wang Yudong Yao	July 2001	A. Datoloum 36334
WPS2651	China's Growth and Poverty Reduction: Trends between 1990 and 1999	Shaohua Chen Yan Wang	July 2001	A. Datoloum 36334
WPS2652	Demand for World Bank Lending	Dilip Ratha	July 2001	S. Crow 30763
WPS2653	The Impact of Farm Credit in Pakistan	Shahidur R. Khandker Rashidur R. Faruquee	August 2001	P. Kokila 33716